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U.S. ENVIRONMENTAL PROTECTION AGENCY REGION 9

SFUND RECORDS CTR  
2380748

Sample Plan Title: Soil and Soil Gas Sample Plan

Site Name: Pacific Fruit Express

Site Location: 2501 East Fairland Stravenue

City/State/Zip: Tucson, Arizona

Site EPA ID #: AZD045804325

Anticipated Sampling Dates: Week or December 20, 1993

Prepared by: John Robertson

11/09/93

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Date

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Expedited Review?

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APPROVED:

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Management Section

Date

Environmental Services Branch, OPM

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**SITE NAME**

**Pacific Fruit Express Company**

**EPA ID #**

**AZD045804325**

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Appendix F.	Sample Treatment and Preservation for RAS and SAS Parameters.



## **I. OBJECTIVE OF SAMPLING EFFORT**

The Arizona Department of Environmental Quality Site Assessment Hydrology Unit will conduct this field sampling effort to gather data as part of a Expanded Site Inspection (ESI) under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA or Superfund). The SI develops information through the collection and verification of data through a site reconnaissance visit, and the collection of environmental samples for analyses. Four routes of human or environmental exposure are evaluated as part of the Hazard Ranking System (HRS): groundwater, surface water, air, and soil exposure. In this sampling effort subsurface soil and soil gas samples will be collected to provide HRS data which will aid in the evaluation of this facility for further action under CERCLA.

The objective of this sampling effort is to determine if there has been a release of hazardous material to the unsaturated zone from the Pacific Fruit Express Company (PFE) property, located at 2501 E. Fairland Stravenue, Tucson, Arizona. Subsurface soil and soil gas samples from depths of 10-12 ft will be collected to determine whether a release of contaminants to the unsaturated zone has occurred and, if so, to identify such contamination. Subsurface soil and soil gas will be collected using the Geoprobe equipment.

Field sampling will be conducted under protocol accepted by the U.S. Environmental Protection Agency (EPA) as specified in the "Preparation of a U.S. EPA Region 9 Sample Plan for EPA-Lead Superfund Projects" guidance document (Quality Assurance Management Section, U.S. EPA, Region 9, November 1992). In addition, the Arizona Department of Environmental Quality (ADEQ), Quality Assurance Project Plan, dated May 1991, was utilized in the preparation of the sampling procedures. Laboratories participating in the EPA Contract laboratory Program (CLP) will be utilized for subsurface soil analyses. The Field Analytical Services Program (FASP) mobile lab will be used for on-site soil gas analyses.

## II. BACKGROUND

A Preliminary Assessment (PA) of PFE was completed by Ecology and Environment Inc. for the EPA on February 11, 1983. It recommended a Site Inspection (SI) be undertaken for this facility, which was subsequently completed on March 7, 1989, by ADEQ. The SI further recommended a Expanded Site Inspection (ESI) be completed, based upon various factors including a large groundwater target population subject to potential Level I concentrations of tetrachloroethene (PCE) and trichloroethene (TCE).

Locally (within four miles of the site), groundwater quality in both the regional and shallow (perched) aquifers has been impacted by petroleum hydrocarbons and volatile organic compounds (VOCs). Although the precise vertical and horizontal extent of the contamination has yet to be adequately defined, the hydrocarbon contamination appears to consist primarily of diesel fuel (occurring as free product both in the perched and regional aquifers). The diesel impacted groundwater appears generally to be present in an area approximately two miles northwest of the PFE facility. Additionally, some VOC contamination (primarily PCE, at levels up to 770  $\mu\text{g/L}$ ) of the regional aquifer has been documented beneath an industrial laundry approximately 1.5 miles northwest of the PFE facility. Investigation of both of these sites is currently in progress under the direction of ADEQ.

PFE was entered into the CERCLA database on December 1, 1979. PFE is listed in the RCRA database (dated July 19, 1993) as a Full Quantity Generator.

PFE is located in Township 14 South, Range 14 East, Section 20, (NE 1/4, SW 1/4, NW 1/4), and at 2501 E. Fairland Stravenue, in Tucson, Arizona. From 1907-1976 PFE was owned and operated jointly by the Southern Pacific and Union Pacific Railroads. However, from 1976 to the present, the facility has been operated solely as a division of the Southern Pacific Railroad (SPRR). Although until recently PFE employed approximately 400 persons, cutbacks within the last several months have significantly reduced the number of employees (currently at 23, with further reductions expected). The site occupies 110 acres and includes approximately 30 structures and 15 railway sidings. The site includes a surface water drainage system (installed about 1959) which underlies much of the site, including the railway car washing facilities. It discharges directly into an oil water separator and to a surface impoundment. The facility also was served by an ice plant from 1907-1968. It was located along the Southern Pacific Railroad tracks approximately 1.5 miles northwest of the northwestern corner of the current facility boundary until it burned down in 1968. The site layout includes a "balloon track" utilized by the SPRR to turn their locomotives around. At various times, from 1958 to the present, PFE and/or SPRR utilized the space within the balloon track for storage of various debris piles. Just southeast of the balloon track is the surface impoundment, which serves as an emergency by-pass to the oil water separator and site drainage system. When surface water runoff is such that the capacity of the oil water separator to treat it is exceeded, the separator is simply by-passed and the effluent passes directly into the lined surface impoundment (designed for a 100 year flood), remaining there pending evaporation of the effluent. South of the surface impoundment the western incinerator ash pile is located, one of two former ash piles located on site. The ash piles resulted from historical burning of debris accumulated from operation of both the PFE site and the SPRR. Approximately one half to three quarters of a mile to the east near the southeastern property boundary is located the site of the other former ash pile. Also near the eastern ash pile is located the drum storage area where apparently empty drums as

well as partially filled drums are stored. Although it is not clear what the empty drums always contained, at the time of the January 1991 site visit the partially filled drums contained used lubrication oil and used anti-freeze. In this same general area of the site and slightly to the east is located the hazardous materials storage area, a chain link fence-enclosed area. The entire PFE site is also enclosed by an eight foot chain link fence. Access to the site is controlled by a manned security gate.

Previously there were seven underground storage tanks (USTs) located on site, two containing gasoline, one with diesel, one with an alkaline soap, and three with used oil and/or solvents. All were removed in approximately 1988. There were soil samples collected from beneath all the removed USTs which were analyzed for total petroleum hydrocarbons (TPH), as well as for benzene, toluene, ethylbenzene and xylene (BTEX).

Although PFE does no manufacturing, it does clean, repair, and maintain refrigerated railroad cars. This involves rebuilding and repairing the diesel generators and refrigeration units contained within the cars. The spent wash and rinse water derived from cleaning of the refrigerated box cars is collected by the site drainage system. Additionally, PFE rebuilds and maintains railroad cars in general, as per Federal Railroad Administration Standards. Such work includes inspection and maintenance of wheels and brakes, as well as overall maintenance of the railway cars.

The topographic gradient (0.01) in the area near PFE is northwestward. The nearest surface water body to the site is Railroad Wash, an ephemeral stream that traverses the site. The nearest perennial water body to the site is a small pond located in Reid Park approximately one mile northeast of the site. The climate in Tucson is arid, with the calculated net precipitation from November through April (the period of heaviest precipitation) being -17.31 inches.

### **III. FIGURES**

Figure 1: Site Location

Figure 2: Site Map, Pacific Fruit Express, Showing Proposed Sampling Locations

Figure 3: Groundwater Elevations Near Pacific Fruit Express

Figure 4: Local Groundwater Quality in the vicinity of PFE

FIGURE 1: Location Map

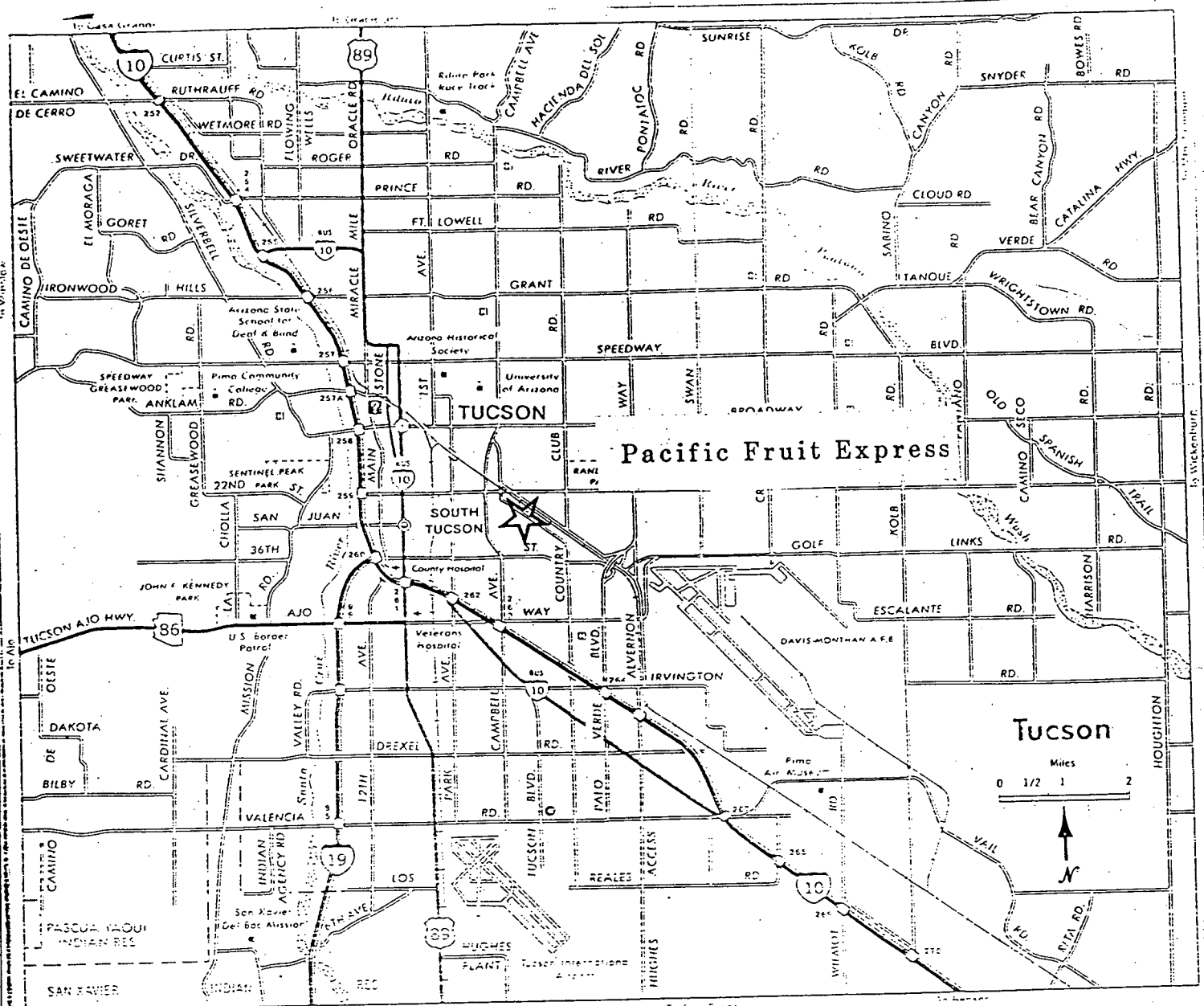
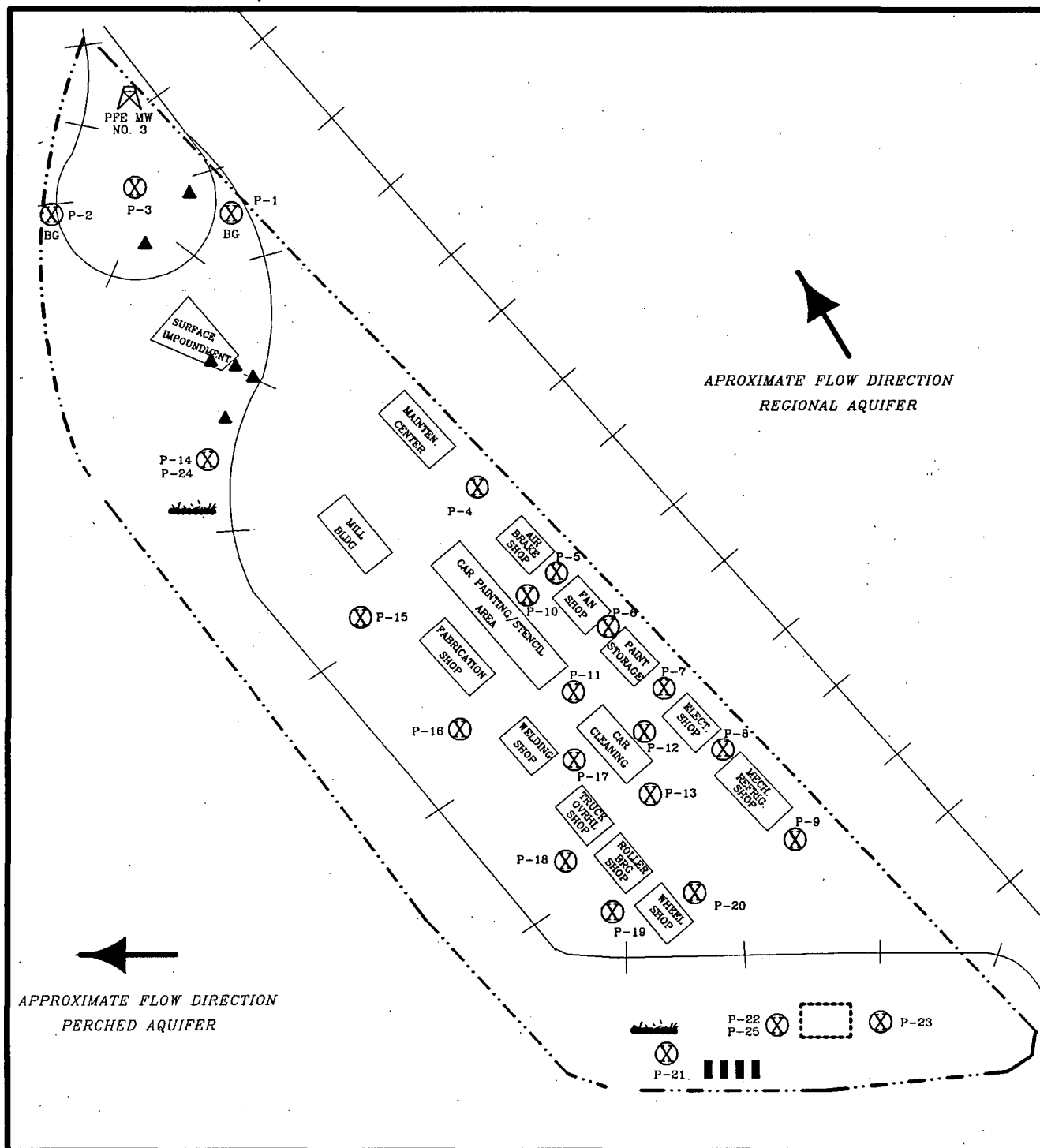


FIGURE 2: PROPOSED SOIL/SOIL GAS SAMPLING LOCATIONS AT THE PFE FACILITY, TUCSON, ARIZONA



# KEY

- PROPOSED SOIL/SOIL GAS SAMPLE LOCATIONS
- PROPOSED SOIL/SOIL GAS BACKGROUND SAMPLE LOCATIONS
- HAZARDOUS MATERIALS STORAGE AREA
- LOCATIONS OF SOIL SAMPLES COLLECTED FOR 1989 SITE INSPECTION
- FORMER LOCATION OF INCINERATOR ASH PILE
- APPROXIMATE LOCATION OF PFE PROPERTY BOUNDARY
- APPROXIMATE LOCATION OF FACILITY MONITOR WELL
- APPROXIMATE LOCATION OF STORED DRUMS

(DRAWING NOT TO SCALE)

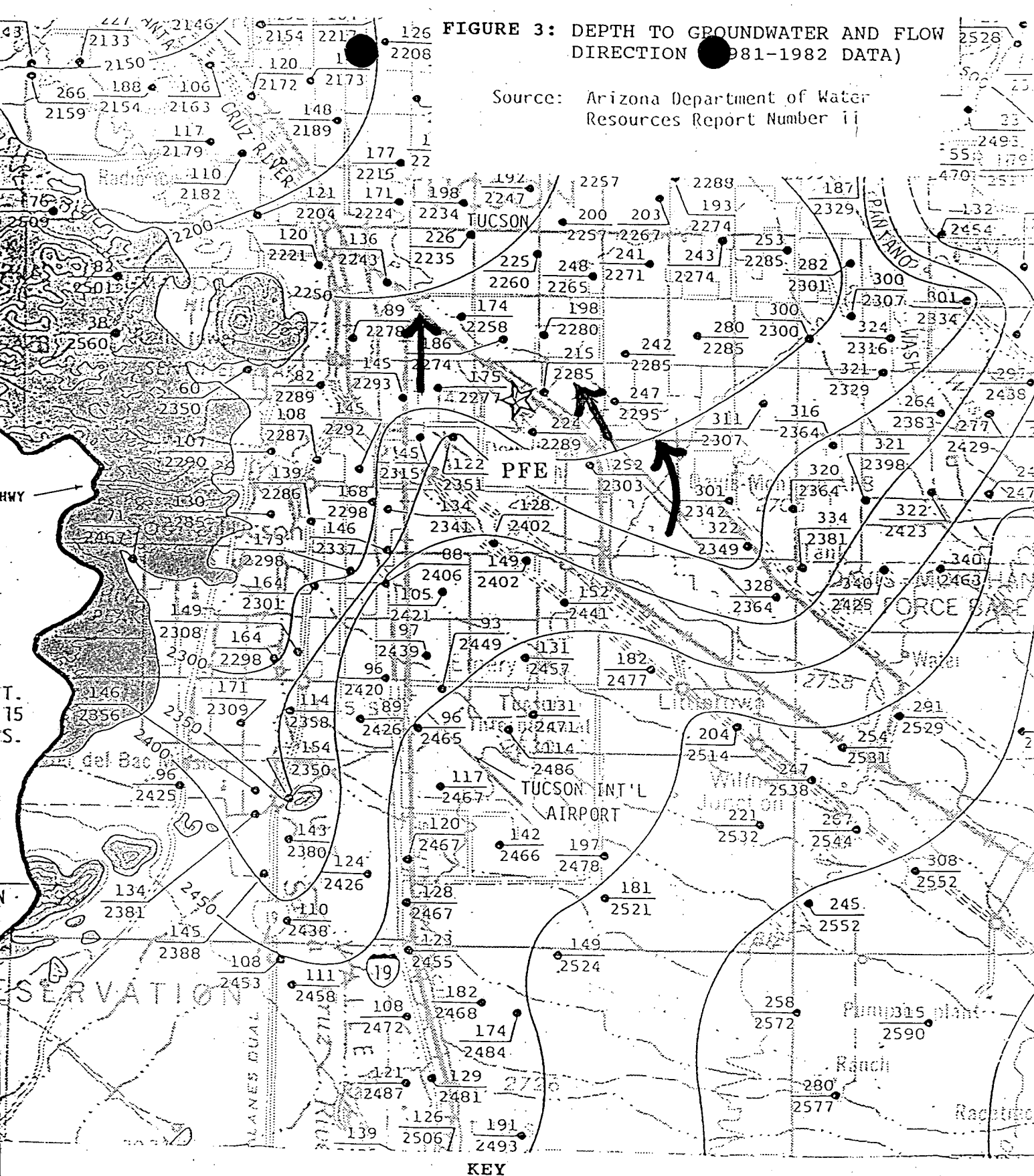
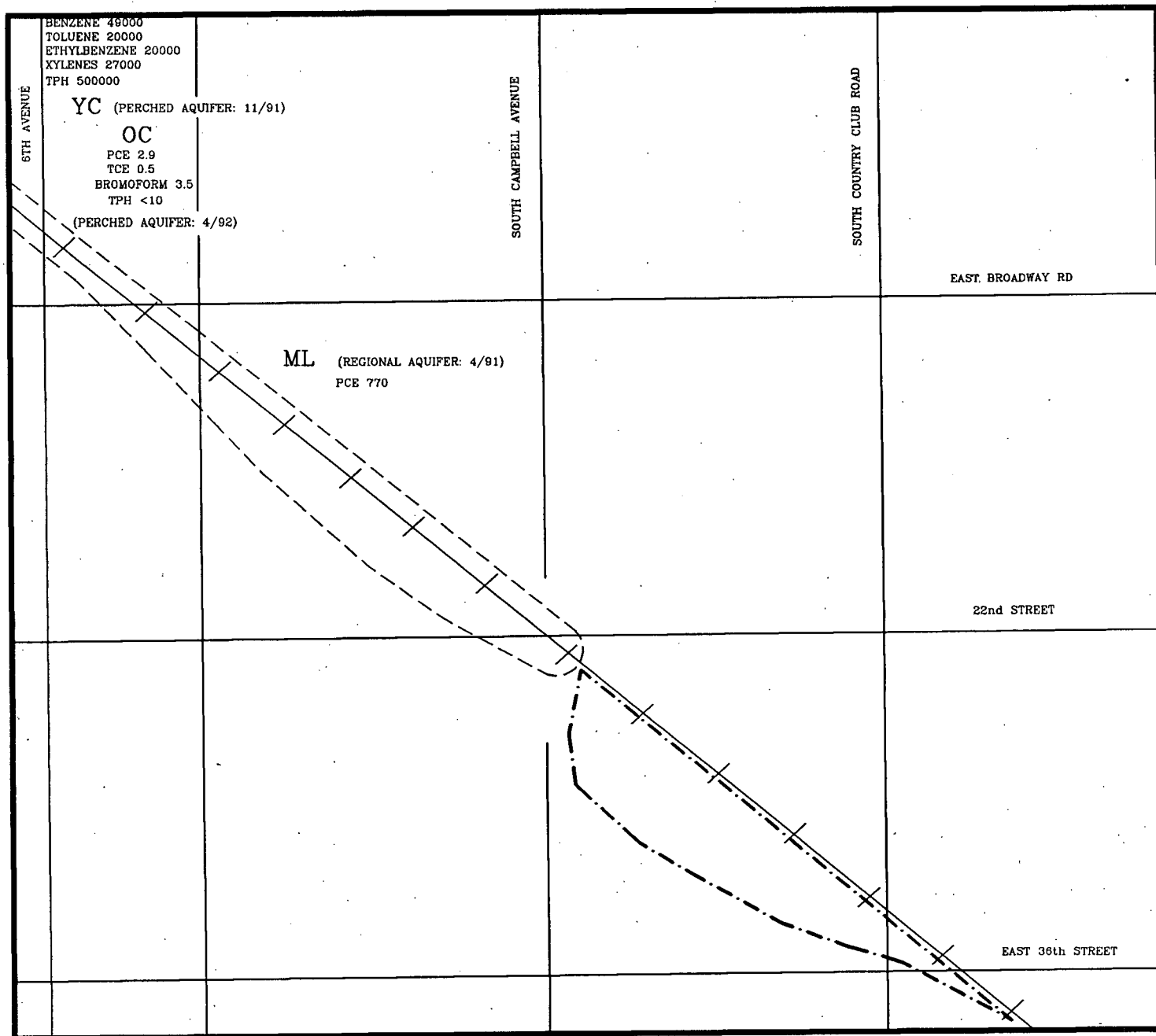


FIGURE 4: LOCAL GROUNDWATER QUALITY NEAR THE PACIFIC FRUIT EXPRESS SITE



KEY

(SOURCE: ADEQ INTERNAL FILES)

YC

SITE OF YELLOW CAB SHOWING RECENT WATER QUALITY DATA FROM A PARTICULAR AQUIFER AND THE SAMPLE DATE

(PERCHED AQUIFER: 11/91)

OC

PCE 2.9  
TCE 0.5  
BROMOFORM 3.5  
TPH <10

(PERCHED AQUIFER: 4/92)

SITE OF OLIVER'S CLEANERS SHOWING RECENT WATER QUALITY DATA FROM A PARTICULAR AQUIFER AND THE SAMPLE DATE

ML

(REGIONAL AQUIFER: 4/91)

PCE 770

SITE OF MISSION LINEN SUPPLY SHOWING RECENT WATER QUALITY DATA FROM A PARTICULAR AQUIFER AND THE SAMPLE DATE

(UNITS: UG/L)

APPROXIMATE BOUNDARY OF THE TUCSON YARD OF THE SOUTHERN PACIFIC RAILROAD

APPROXIMATE BOUNDARY OF THE PACIFIC FRUIT EXPRESS COMPANY



MILES



#### IV. HRS CONSIDERATIONS/RATIONALE

##### A. Waste Characteristics

##### A.1 Waste Type and Quantity

Washing of the refrigerated box cars is accomplished using water and an alkaline soap ("Leeder Ardox, 368-G"; usage rate unknown). The runoff wash and rinse water passes directly into the site drainage system. The lighter, oily waste skimmed off by the oil water separator is contained within a 500 gallon tank and transported off site by a hazardous waste transporter, whereas the water, after treatment by the oil water separator, is discharged into the city sewer system. Rebuilding and servicing of the refrigeration units for the box cars involves the usage of "Safety Kleen" solvent, which is contained within parts washer bins at various locations on site. The Safety Kleen is recycled until it can no longer be used, whereupon it is removed from the site by the Safety Kleen Corporation. Other chemicals used on site (and the approximate amounts consumed annually) for maintenance of the railway cars and the various other vehicles (pickups, passenger cars, etc.) required by the facility include the alkaline cleaner "SP-312" (approximately 6,000 gallons per year); the solvent and paint thinner "SP-325" (approximately 500 gallons per year) containing paraffins, naphthenes, chlorinated hydrocarbons, aromatic hydrocarbons and acetate esters; a powdered alkaline cleaner, "Turco Alkaline Cleaner" (approximately 500 gallons per year); chlorofluorocarbons (approximately 400 gallons per year) and unknown amounts of both isopropyl alcohol (used to fuel heaters in the box cars during the winter) and ethylene glycol. There is reportedly no information available regarding the types or amounts of solvents used prior to 1980. The site does contain a hazardous materials storage area (established in 1988), as well as various satellite hazardous materials storage locations. They may contain waste paint and paint thinner, sand blasting debris, other waste flammables, waste corrosives, and nickel/cadmium batteries.

Further information regarding waste conditions within the facility may be inferred from a review of the sampling conducted as part of the original SI investigation. Seven soil samples (including one duplicate) and six groundwater samples (including one duplicate) were collected on site in 1988 and submitted to an EPA contract lab for VOC, semi-volatile compound, and metals analyses. All of these particular soil samples were collected in the vicinity of the surface impoundment (Figure 2). The groundwater samples (from the regional aquifer) were all collected from upgradient and downgradient wells within one mile of the site. The soil samples showed elevated levels of some semi-VOAs (various hydrocarbons, phenols and naphthalenes, up to 4,000  $\mu\text{g/Kg}$ ); Freon 113 (the refrigerant utilized on site), at a level of 15  $\mu\text{g/Kg}$ ; and chromium and lead were detected at levels up to 208  $\mu\text{g/Kg}$  and 858  $\mu\text{g/Kg}$ , respectively; no significant levels of VOCs were detected in any of the soil samples. None of the groundwater samples (all collected from the regional aquifer) showed significant levels of either VOCs or metals.

##### A.2 Proposed Sampling

This sampling effort is designed to identify any possible contamination by hazardous substances of the shallow subsurface soils on site. To meet the objectives of the sampling plan, a total of 25 subsurface soil samples will be collected. These include two background samples and two duplicates for quality assurance and quality control purposes. Also, 27 soil gas samples will be collected at the same locations as the soil samples, as well as one ambient air (above ground)

sample to be collected near the hazardous materials storage area (along the southern boundary of the facility), and a "system blank" of ultra pure air. Two duplicates will also be collected for quality assurance/quality control purposes. Soil gas samples are collected to provide a wider range of data for the investigation. One equipment blank will be collected from the soil sampling equipment prior to any sample collection, and submitted as a rinsate sample. The sampling is scheduled for the week of December 20, 1993.

The subsurface soil samples will be collected from depths of 10-12 ft below land surface (bls). The soil gas samples will be collected prior to the soil samples (and from the same borings) from a depth of 5 ft bls, and then the Geoprobe will be advanced an additional 7 ft for collection of the soil samples. The rationale for all of the sample locations is provided in the following paragraphs. Sample locations were selected based upon aerial photo interpretation of photos dating from 1949-1992, as well as upon interpretation of land usage practices as determined from interviews of site personnel. The locations for the soil and soil gas samples are given in Figure 2.

#### **Subsurface Soil and Soil Gas Sample No. 1 (P-1)**

P-1 will be collected at the northeast corner of the balloon track, where aerial photos indicate minimal activities to have occurred historically (1947-present). This sample will serve as one of two background samples. This location was chosen to determine potential contaminant levels in the soil and soil gas where these media are not likely to have been impacted by site activities.

#### **Subsurface Soil and Soil Gas Sample No. 2 (P-2)**

P-2 will be collected at the southwest corner of the balloon track, where aerial photos indicate minimal activities to have occurred historically (1947-present). This sample will serve as the second background sample. This location was chosen to determine potential contaminant levels in the soil and soil gas where these media are not likely to have been impacted by site activities.

#### **Subsurface Soil and Soil Gas Sample No. 3 (P-3)**

P-3 will be collected inside the balloon track, where historical aerial photos indicate debris piles have been located. This sample was chosen because there are apparently no records which log historical storage and identification of materials and debris here, and consequently no information is available regarding the potential for subsurface migration of contaminants from the debris piles.

#### **Subsurface Soil and Soil Gas Samples No's. 4-13 (P-4, ..., P-13)**

Samples P-4 through P-12 will be collected among a series of buildings where historical site activities may have potentially contributed to degradation of subsurface soil quality. Based upon the characterization of general activities which occur or have occurred in these buildings (as provided by facility records), and lacking specific information regarding improper/unauthorized disposal practices which might have occurred in these areas, data collection from these sample locations appears particularly valuable.

#### **Subsurface Soil and Soil Gas Sample No. 14 (P-14)**

P-14 will be collected near the former location of the western-most incinerator ash pile, one of two former ash piles located on site. Collection of a subsurface soil sample here is particularly valuable due to the unknown yet potentially significant number of contaminants which may have been present within the ash piles.

**Subsurface Soil and Soil Gas Sample No's. 15-20 (P-15, ..., P-20)**

Like Samples P-4 through P-13, samples P-15 through P-20 will also be collected among the buildings where historical site activities may have potentially contributed to degradation of subsurface soil quality. Based upon the characterization of general activities which occur or have occurred in these buildings (as provided by facility records), and lacking specific information regarding improper/unauthorized disposal practices which might have occurred in these areas, data collection from these sample locations appears particularly valuable.

**Subsurface Soil and Soil Gas Sample No. 21 (P-21)**

P-21 will be collected near the former location of the eastern-most incinerator ash pile, one of two former ash piles located on site. Collection of a subsurface soil sample here is particularly valuable due to the unknown yet potentially significant number of contaminants which may have been present within the ash piles.

**Subsurface Soil and Soil Gas Sample No. 22 (P-22)**

P-22 will be collected near the west side of the hazardous materials storage area, at the southeast corner of the property. Although this structure has been in use only since 1988, it is important to collect a soil and soil gas sample here to help determine whether any releases have occurred.

**Subsurface Soil and Soil Gas Sample No. 23 (P-23)**

P-23 will be collected near Sample P-22, but on the other (eastern) side of the hazardous materials storage area. This sample is important to further help determine whether any releases have occurred from the hazardous materials storage area.

**Subsurface Soil and Soil Gas Sample No. 24 (P-24)**

P-24 is the duplicate sample of P-14, and will be collected as close as is practical to boring P-14.

**Subsurface Soil and Soil Gas Sample No. 25 (P-25)**

P-25 is the duplicate sample of P-22, and will be collected as close as is practical to boring P-22.

**Subsurface Soil Gas Sample No. 26 (P-26)**

P-26 is the ambient air sample. It will be collected at approximately 2 feet above the ground surface near the hazardous materials storage area.

**Subsurface Soil Gas Sample No. 27 (P-27)**

P-27 is the system blank. It will consist of ultra pure air.

B. Groundwater Pathway

B.1 Hydrogeology

The City of Tucson is located in a broad, alluvial, northwest-trending valley which encompasses approximately 1,000 square miles. It has been classified by the Arizona Department of Water Resources as being within the Tucson Basin subarea of the Upper Santa Cruz Groundwater Basin. The Tucson Basin is situated with the Tortolita and Santa Catalina Mountains to the north, the Tanque Verde, Rincon, Empire, and Santa Rita Mountains to the east, and the Sierrita, Black, and Tucson Mountains to the west. These mountains are composed of intrusive, volcanic and metamorphosed sedimentary rocks ranging in age from Precambrian to Tertiary. The sedimentary basin deposits are derived from these mountains and, in stratigraphically ascending order, are: the Pantano Formation, the Tinaja Beds, the Fort Lowell Formation, and the Holocene stream deposits. These units together have been interpreted as comprising a single, unconfined, regional, sole source aquifer. Although these units appear to be somewhat continuous to the north and south of the facility, in some areas certain units may thin or become absent entirely.

Regionally, the Pantano Formation consists of poorly cemented to well cemented sandstones, conglomerates, and mudstone. This formation is of Oligocene age and unconformably overlies the various crystalline igneous, metamorphic, and sedimentary rocks that comprise the basement rock complex. The Pantano Formation is estimated to be thousands of feet thick within the Tucson Basin. The Tinaja Beds are of Miocene and Pliocene age and include three sedimentary units: the lower, middle, and upper Tinaja Beds. The lower Tinaja Beds consist of silty gravel and conglomerate. The middle Tinaja Beds are made up of a thick sequence of mudstone, gypsum, and anhydrite-bearing clayey silt. The upper Tinaja Beds consist of unconsolidated sand and clayey silt layers. The Tinaja Beds vary in thickness throughout the Basin, but are estimated to be 2,000 feet thick in the middle of the basin. The Fort Lowell Formation is of Pleistocene age and consists of unconsolidated gravel and clayey silt and is estimated to range from 24 to 434 feet in thickness within the basin. The Holocene stream deposits comprise modern flood plain and channel deposits associated with the numerous ephemeral washes and rivers that drain the Tucson basin. These fluvial sediments consist of unconsolidated and interbedded coarse sands, gravelly silts and clayey silts. The thickness of this unit is highly variable and ranges from 20 to 100 feet along the major stream drainages.

The primary source of groundwater in the Tucson Basin is the Fort Lowell Formation. In the area around PFE, this unit is estimated to be 300-400 feet thick, with a transmissivity calculated by the City of Tucson Water Department ("Tucson Water") for wells perforated within this unit, to be approximately 50,000 gpd/ft. The Holocene stream alluvium is saturated only during periods of high runoff and is not a source of groundwater in this area.

Well drillers logs for the on site monitor well indicate caliche from 0-50 feet, sandy silt with "caliche streaks" from 50-115 feet, and clay from 115-116 feet. However, a production well drilled within one quarter mile north of this monitor well indicates sand from 10-50 feet, and sandy gravel and/or gravel and/or sand from 50-500 feet.

Depth to groundwater on site is approximately 114 ft (1991 data), in the perched aquifer, and approximately 187 feet (1987 data) in the regional aquifer. Groundwater flow direction in the perched aquifer is westerly, and northwesterly in the regional aquifer.

## B.2 Ground water Use

Within a four mile radius of PFE, there are approximately 29 public supply wells and 143 domestic wells serving a total (1990) population estimated at over 573,000 persons.

## B.3 Proposed Sampling

A phased approach to sampling is being adopted, and therefore no groundwater sampling is planned for this phase of the investigation, pending soil and soil gas sampling results.

## C. Surface Water Pathway

The surface water pathway will not be evaluated in this sampling effort due to a lack of surface water targets.

## D. Air Pathway

Although PFE does have an air pollution control permit issued by Pima County (required for operation of the paint shop), the volume of air emissions from the site, particularly considering the recent employment cutbacks, does not appear to be significant. Additionally, the possibility of a hazardous waste-contaminated particulate release to the air originating from areas of bare soil on site does not appear to be a significant threat. Consequently, the air pathway will not be evaluated in this sampling effort.

## E. Soil Exposure Pathway

No surficial soil sampling is planned for this investigation. Chemicals maintained on site are considered to represent a comparatively low risk to the public. All potential sources within two feet of the surface are located above ground.

## V. REQUEST FOR ANALYSIS

The general analytical parameters for proposed sample analyses methods are identified in Tables 2 and 3. Analyses requested through the EPA Contract Lab Program (CLP) are classified as Routine Analytical Services (RAS) or Special Analytical Services (SAS). The request for analyses, required preservatives and holding times for each sample are presented in Tables 4, 5 and 6.

It is expected the sampling will be conducted during the week of December 20, 1993. In order to meet the stated objectives of the sampling effort, a total of 25 low concentration soil samples will be submitted for SAS 8010A/8020A analyses and for RAS Total Metals and Cyanide. The SAS analysis has been selected for its ability to detect chlorofluorocarbons, as well as the comparatively lower detection limits attainable. The soil samples include two duplicates and one background sample for quality assurance and quality control purposes. One equipment blank per day for each particular Target Compound List (TCL), i.e. both SAS 8010A/8020A and RAS Total Metals and Cyanide, will be submitted from the soil sampling equipment for analysis as rinsate samples. A total of 27 soil gas samples will be submitted to the EPA Field Analytical Services Program (FASP) mobile lab for analyses. This includes two duplicates, one system blank and one ambient air sample. The requests for analyses of the CLP and FASP are discussed below with respect to the sample matrix.

### A. CLP SAS REQUEST

#### A.1 Soils

Proposed soil samples will be analyzed through the CLP using SAS. The proposed method for the SAS soil analysis is the analysis of low and/or medium concentration water and/or soil samples for purgeable halocarbons and aromatics by SW846 Methods 8010A and 8020A (Revision 1, November 1990), respectively. Due to a lack of information indicating otherwise, low concentrations of contaminants in the site soils are expected. The SAS Client Request form 8010SAS.CRF (Revision 12-17-92) is included as Appendix A. SAS procedures in 8010SAS.CRF have been reviewed and are considered acceptable. The compounds to be included in this SAS request are those on the CLP TCL EPA Method 8010A/8020A + Freon 113. In addition to the compounds listed, trichlorotrifluoroethane (Freon 113) is requested for inclusion in this method. Table 2 lists the specific TCL parameters and appropriate detection limits to be covered by this request. Chlorofluorocarbons and VOCs that may have been used at the facility, the degradation products of these VOCs, and the VOCs detected in the ground water such as tetrachloroethene (PCE) and trichlorotrifluoroethane can be detected by this SAS analysis. The soil samples will also be analyzed using RAS laboratory methods for Total Metals and Cyanide. The inorganic Target Analyte List (TAL), along with the appropriate detection limits, is included in Table 4. Twenty five low concentration soil samples will be submitted for analysis.

#### A.2 Rinsate

One equipment blank per day from the Geoprobe soil sampling equipment will be submitted as a rinsate sample. The proposed method of analysis for the rinsate sample is the analysis of low and/or medium concentration water and/or soil samples for purgeable halocarbons and aromatics by SW846 Methods 8010A and 8020A + Freon 113 (Revision 1, November 1990), respectively.

The compounds to be included in this SAS request are those on the CLP TCL EPA Method 8010A/8020A. Table 2 lists the specific TCL parameters and appropriate detection limits to be covered by this request. VOCs that may have been used at the facility, the degradation products of these VOCs (including the VOCs detected in the local groundwater such as PCE can be detected by this SAS analysis. A total of two rinsate samples will be submitted for analysis.

## B. CLP RAS REQUEST

### B.1 Soils

Proposed soil samples will be analyzed through the CLP using RAS laboratory methods. The proposed method for soil analysis is the analysis of low and/or medium concentration water and/or soil samples for Total Metals and Cyanide. The compounds to be included in this RAS request are those on the CLP TCL and TAL. Table 4 lists the specific TCL parameters and appropriate detection limits to be covered by this request. Compounds that were potentially used or disposed of on site can be detected by this RAS analysis. Twenty five low concentration soil samples will be submitted for analysis.

### B.2 Rinsate

One equipment blank per day from the Geoprobe soil sampling equipment will be submitted as rinsate samples. A total of two rinsate samples will be submitted for analysis. The proposed method of analysis for the rinsate sample is the analysis of low and/or medium concentration water and/or soil samples for Total Metals and Cyanide. The compounds to be included in this RAS request are those on the CLP TCL EPA Method for Total Metals and Cyanide. Table 4 lists the specific TCL parameters and appropriate detection limits to be covered by this request.

## C. NON-CLP REQUEST

### C.1 Soil gas

The use of the FASP lab is requested during this sampling event because ADEQ has experienced loss of soil gas samples, exceedence of holding times and inability to quantify contaminants by fixed laboratories within the state. Soil gas will be used to evaluate the site because recent publications have identified the shortcomings associated with conventional VOC soil sampling techniques and analytical methods. As no CLP labs are located within the state, these QA/QC problems are expected to be exaggerated by requiring shipment of soil gas samples to out of state labs. Soil gas samples will be analyzed on site by the FASP mobile lab utilizing the FASP Primary Analyte List, with the addition of two compounds (dichlorodifluoromethane and trichlorofluoromethane) from the FASP Supplemental Analyte List. Table 3, the Modified FASP Analyte List, includes the specific parameters and appropriate detection limits to be covered by this request. A total of 27 soil gas samples will be submitted. This includes two duplicates, one system blank and one ambient air sample.

Region IX FASP Standard Operating Procedure (SOP) No. F93013, Analysis of Halogenated and Aromatic Volatile Organic Compounds in Whole Gas Samples by Purge and Trap Gas Chromatography has been reviewed and is considered acceptable. Table 1, Summary of FASP

Quality Control Requirements includes the analytical precision and accuracy goals requested from the FASP mobile Lab.

The reporting limits in Table 3 are expressed in the weight unit of nanograms (ng). These reporting limits will be adjusted based on the volume used for soil gas analysis to obtain concentration units of ng per milliliter (ng/ml) or parts per billion.

The reporting requirements requested from the FASP lab are identical to Section 8, Review of Analytical Results and Section 9, Reporting as included in SOP F93013.

**TABLE 1**  
Summary of FASP Quality Control Requirements

QC SAMPLE	ACCEPTANCE CRITERIA FOR WHOLE GAS SAMPLE	FREQUENCY
Blank	Less than reporting limit of all target analytes	1 blank analysis each 24 hours
Initial Calibration	Relative Standard Deviation $\leq 25\%$ for average analyte concentration factor	As necessary
Continuing Calibration	Percent Difference for concentration factors compared to initial calibration $\leq 25\%$	1 continuing calibration each 24 hours
Laboratory Control Sample	70%-125%	After each successful calibration and each 10 samples
Surrogates	65%-130%	Every analysis
Matrix Spike and Spike Duplicate	Recovery: 65%-130% Precision: RSD < 50%	1 set per each 20 field samples analyzed or weekly



**TABLE 2**  
Target Compound List -  
EPA Method 8010A/8020A<sup>1</sup>

Parameter	Contract Required Quantification Limits (CRQL) <sup>2</sup>	
	Low/med. Water µg/L	Low/med. Soil/Sediment µg/kg
Benzene	2.0*	2.0*
Benzyl chloride	2.0	2.0
Bromobenzene	2.0	2.0
Bromodichloromethane	1.0	1.0
Bromoform	2.0	2.0
Bromomethane	3.0	3.0
Carbon tetrachloride	1.2	1.2
Chlorobenzene	2.0*	2.0*
Chloroethane	5.2	5.2
2-Chloroethyl vinyl ether	1.3	1.3
Chloroform	0.5	0.5
Chloromethane	0.8	0.8
Dibromochloromethane	0.9	0.9
Dibromomethane	2.0	2.0
1,2-Dichlorobenzene	4.0*	4.0*
1,3-Dichlorobenzene	4.0*	4.0*
1,4-Dichlorobenzene	3.0*	3.0*
Dichlorodifluoromethane	2.0	2.0
1,1-Dichloroethane	0.7	0.7
1,2-Dichloroethane	0.3	0.3
1,1-Dichloroethene	1.3	1.3
trans-1,2-Dichloroethene	1.0	1.0
Dichloromethane	1.0	1.0
1,2-Dichloropropane	0.4	0.4
cis-1,3-Dichloropropene	3.4	3.4
trans-1,3-Dichloropropene	3.4	3.4
Ethyl Benzene	2.0*	2.0*
1,1,2,2-Tetrachloroethane	0.3	0.3
1,1,1,2-Tetrachloroethane	0.3	0.3
Tetrachloroethene	0.3	0.3
Toluene	2.0*	2.0*
1,1,1-Trichloroethane	0.3	0.3
1,1,2-Trichloroethane	0.2	0.2
Trichloroethene	1.2	1.2
Trichlorofluoromethane	2.0	2.0
1,2,3-Trichloropropane	1.0	1.0
Vinyl chloride	1.8	1.8
Xylenes	2.0*	2.0*
Trichlorotrifluoroethane	0.5	1.0

(1) Specific quantification limits are highly matrix dependent. The quantification limits listed are for guidance and may not always be achievable.

(2) Quantification limits listed for soil/sediment are based on wet weight. The quantification limits calculated by the laboratory for soil/sediment, calculated on dry weight basis as a requirement by the contract, will be higher.

(\*) 8020A Compounds, CRQL determined on PID

**TABLE 3**  
**FASP Analyte List**

Parameter	Reporting Limit nanograms
Chloromethane	10.0
Bromomethane	10.0
Vinyl Chloride	10.0
Chloroethane	10.0
Methylene Chloride	1.0
1,1-Dichloroethene	1.0
1,1-Dichloroethane	1.0
cis-1,2-Dichloroethene	1.0
trans-1,2-Dichloroethene	1.0
Chloroform	1.0
1,2-Dichloroethane	1.0
1,1,1-Trichloroethane	1.0
Carbon tetrachloride	1.0
Bromodichloromethane	1.0
1,2-Dichloropropene	1.0
1,2-Dichloropropane	1.0
1,1,2,2-Tetrachloroethane	1.0
trans-1,3-Dichloropropene	1.0
Trichloroethene	1.0
Dibromochloromethane	1.0
1,1,2-Trichloroethane	1.0
Benzene	1.0
cis-1,3-Dichloropropene	1.0
Bromoform	1.0
Tetrachloroethene	1.0
Toluene	1.0
Chlorobenzene	1.0
Ethylbenzene	1.0
Total Xylenes	1.0
Styrene	1.0
1,2-Dichlorobenzene	1.0
1,3-Dichlorobenzene	1.0
1,4-Dichlorobenzene	1.0
Dichlorodifluoromethane	1.0
Trichlorofluoromethane	1.0

**TABLE 4**  
**Inorganic Target Analyte List (TAL)**  
**METALS AND CYANIDE**

Analyte	Contract Required Detection Limit <sup>(1,2)</sup> (µg/L)	(mg/kg)
Aluminum	200	40
Antimony	60	12
Arsenic	10	2
Barium	200	40
Beryllium	5	1
Cadmium	5	1
Calcium	5000	1000
Chromium	10	2
Cobalt	50	10
Copper	25	5
Iron	100	20
Lead	3	0.6
Magnesium	5000	1000
Manganese	15	3
Mercury	0.2	0.04
Nickel	40	8
Potassium	5000	1000
Selenium	5	1
Silver	10	2
Sodium	5000	1000
Thallium	10	2
Vanadium	50	10
Zinc	20	4
Cyanide	10	2

- (1) Subject to the restrictions specified in the first page of Part G, Section IV of Exhibit D (Alternate Methods - Catastrophic Failure) any analytical method specified in SOW Exhibit D may be utilized as long as the documented instrument or method detection limits meet the Contract Required Detection Limit (CRDL) requirements. Higher detection limits may only be used in the following circumstance:

If the sample concentration exceeds five times the detection limit of the instrument or method in use, the value may be reported even though the instrument or method detection limit may not equal the Contract Required Detection Limit. This is illustrated in the example below:

For lead:

Method in use - ICP  
Instrument Detection Limit (IDL) - 40  
Sample concentration - 220  
Contract Required Detection Limit (CRDL) - 5

The value of 220 may be reported even though instrument detection limit is greater than CRDL. The instrument or method detection limit must be documented as described in Exhibit E.

- (2) The CRDL are the instrument detection limits obtained in pure water that must be met using the procedure in Exhibit E. The detection limits for samples may be considerably higher depending on the sample matrix.

## ANALYSES REQUESTED

MATRIX = SOIL

TABLE 5

Page 1 of 3

CLP ANALYSES REQUESTED					ROUTINE ANALYTICAL SERVICES (RAS)							SPECIAL ANALYTICAL SERVICES (SAS)			TOTAL NO. OF LINERS PER SAMPLE
CHEMISTRY TYPE					ORGANIC				INORGANIC						
SPECIFIC ANALYSES REQUESTED					TCL VOAS (low/med)	TCL SEMI- VOAS (low/med)	PESTICIDES & PCBS (low/med)		METALS & CYANIDE (low/med)	METALS ONLY (low/med)	CYANIDE ONLY (low/med)	METHOD 8010A/8020A			
PRESERVATIVES					Chill to 4°C	Chill to 4°C	Chill to 4°C		Chill to 4°C		Chill to 4°C	Chill to 4°C			
ANALYTICAL HOLDING TIME(S)					Hold <14 days	Hold <14 days prior to extraction 40 days after extraction	Hold <14 days prior to extraction 40 days after extraction		14 days for CN, Metals <6 months [28 days for Hg]	Hold to <6 months [28 days for Hg]	14 days	Hold <14 days			
CONTRACT HOLDING TIME(S)					Hold <10 days	Hold <10 days prior to extraction 40 days after extraction	Hold <10 days prior to extraction 40 days after extraction		12 days for CN, Metals <35 days [26 days for Hg]	Hold <35 days [26 days for Hg]	12 days	Hold <10 days			
SAMPLE × SAMPLE					NO. OF LINERS PER ANALYSIS	NO. OF LINERS PER ANALYSIS	NO. OF LINERS PER ANALYSIS	NO. OF LINERS PER ANALYSIS	NO. OF LINERS PER ANALYSIS	NO. OF LINERS PER ANALYSIS	NO. OF LINERS PER ANALYSIS	NO. OF LINERS PER ANALYSIS	NO. OF LINERS PER ANALYSIS	NO. OF LINERS PER ANALYSIS	TOTAL NO. OF LINERS PER SAMPLE
SAMPLE NUMBER	SAMPLE LOCATION	SAMPLING SCHEDULE	CONCENTRATION		1" × 10" acetate liner	1" × 8" acetate liner	1" × 5" acetate liner		1" × 10" acetate liner	1" × 10" acetate liner	1" × 10" acetate liner	1" × 8" acetate liner			
			Low	Med.											
1	P-1 (background)	Week of 12/20	X						1			1			2
2	P-2 (background)	Week of 12/20	X						1			1			2
3	P-3	Week of 12/20	X						1			1			2
4	P-4	Week of 12/20	X						1			1			2
5	P-5	Week of 12/20	X						1			1			2
6	P-6	Week of 12/20	X						1			1			2
7	P-7	Week of 12/20	X						1			1			2
8	P-8	Week of 12/20	X						1			1			2
9	P-9	Week of 12/20	X						1			1			2
10	P-10	Week of 12/20	X						1			1			2
11	P-11 (QA/QC)	Week of 12/20	X						1			1			2

(continued on next page)

## ANALYSES REQUESTED

MATRIX = SOIL

TABLE 5

Page 2 of 3

CLP ANALYSES REQUESTED					ROUTINE ANALYTICAL SERVICES (RAS)							SPECIAL ANALYTICAL SERVICES (SAS)			TOTAL NO. OF LINERS PER SAMPLE
CHEMISTRY TYPE					ORGANIC				INORGANIC						
SPECIFIC ANALYSES REQUESTED					TCL VOAS (low/med)	TCL SEMI- VOAS (low/med)	PESTICIDES & PCBS (low/med)		METALS & CYANIDE (low/med)	METALS ONLY (low/med)	CYANIDE ONLY (low/med)	METHOD 8010A/8020A			
PRESERVATIVES					Chill to 4°C	Chill to 4°C	Chill to 4°C		Chill to 4°C		Chill to 4°C	Chill to 4°C			
ANALYTICAL HOLDING TIME(S)					Hold < 14 days	Hold < 14 days prior to extraction 40 days after extraction	Hold < 14 days prior to extraction 40 days after extraction		14 days for CN, Metals < 6 months [28 days for Hg]	Hold to < 6 months [28 days for Hg]	14 days	Hold < 14 days			
CONTRACT HOLDING TIME(S)					Hold < 10 days	Hold < 10 days prior to extraction 40 days after extraction	Hold < 10 days prior to extraction 40 days after extraction		12 days for CN, Metals < 35 days [26 days for Hg]	Hold < 35 days [26 days for Hg]	12 days	Hold < 10 days			
SAMPLE × SAMPLE					NO. OF LINERS PER ANALYSIS	NO. OF LINERS PER ANALYSIS	NO. OF LINERS PER ANALYSIS	NO. OF LINERS PER ANALYSIS	NO. OF LINERS PER ANALYSIS	NO. OF LINERS PER ANALYSIS	NO. OF LINERS PER ANALYSIS	NO. OF LINERS PER ANALYSIS	NO. OF LINERS PER ANALYSIS	NO. OF LINERS PER ANALYSIS	
SAMPLE NUMBER	SAMPLE LOCATION	SAMPLING SCHEDULE	CONCENTRATION		1" × 10" acetate liner	1" × 8" acetate liner	1" × 5" acetate liner		1" × 10" acetate liner	1" × 10" acetate liner	1" × 10" acetate liner	1" × 8" acetate liner			
			LOW	MED.											
12	P-12	Week of 12/20	X						1			1			2
13	P-13	Week of 12/20	X						1			1			2
14	P-14	Week of 12/20	X						1			1			2
15	P-15	Week of 12/20	X						1			1			2
16	P-16	Week of 12/20	X						1			1			2
17	P-17	Week of 12/20	X						1			1			2
18	P-18	Week of 12/20	X						1			1			2
19	P-19	Week of 12/20	X						1			1			2
20	P-20	Week of 12/20	X						1			1			2
21	P-21 (QA/QC)	Week of 12/20	X						1			1			2
22	P-22	Week of 12/20	X						1			1			2

(continued on next page)

## ANALYSES REQUESTED

MATRIX = SOIL

TABLE 5

Page 3 of 3

CLP ANALYSES REQUESTED					ROUTINE ANALYTICAL SERVICES (RAS)							SPECIAL ANALYTICAL SERVICES (SAS)			TOTAL NO. OF LINERS PER SAMPLE
CHEMISTRY TYPE					ORGANIC				INORGANIC						
SPECIFIC ANALYSES REQUESTED					TCL VOAS (low/med)	TCL SEMI- VOAS (low/med)	PESTICIDES & PCBs (low/med)		METALS & CYANIDE (low/med)	METALS ONLY (low/med)	CYANIDE ONLY (low/med)	METHOD 8010A/8020A			
PRESERVATIVES					Chill to 4°C	Chill to 4°C	Chill to 4°C		Chill to 4°C		Chill to 4°C	Chill to 4°C			
ANALYTICAL HOLDING TIME(S)					Hold < 14 days	Hold < 14 days prior to extraction 40 days after extraction	Hold < 14 days prior to extraction 40 days after extraction		14 days for CN, Metals < 6 months [28 days for Hg]	Hold to < 6 months [28 days for Hg]	14 days	Hold < 14 days			
CONTRACT HOLDING TIME(S)					Hold < 10 days	Hold < 10 days prior to extraction 40 days after extraction	Hold < 10 days prior to extraction 40 days after extraction		12 days for CN, Metals < 35 days [26 days for Hg]	Hold < 35 days [26 days for Hg]	12 days	Hold < 10 days			
SAMPLE × SAMPLE					NO. OF LINERS PER ANALYSIS	NO. OF LINERS PER ANALYSIS	NO. OF LINERS PER ANALYSIS	NO. OF LINERS PER ANALYSIS	NO. OF LINERS PER ANALYSIS	NO. OF LINERS PER ANALYSIS	NO. OF LINERS PER ANALYSIS	NO. OF LINERS PER ANALYSIS	NO. OF LINERS PER ANALYSIS	NO. OF LINERS PER ANALYSIS	
SAMPLE NUMBER	SAMPLE LOCATION	SAMPLING SCHEDULE	CONCENTRATION		1" × 10" acetate liner	1" × 8" acetate liner	1" × 5" acetate liner		1" × 10" acetate liner	1" × 10" acetate liner	1" × 10" acetate liner	1" × 8" acetate liner			
			Low	MED.											
23	P-23	Week of 12/20	X						1			1		2	
24	P-24 (duplicate P-14)	Week of 12/20	X						1			1		2	
25	P-25 (duplicate P-22)	Week of 12/20	X						1			1		2	
Total Low Concentration									25			25		50	
Total Medium Concentration															

## ANALYSES REQUESTED

MATRIX = RINSATE

TABLE 6

Page 1 of 1

CLP ANALYSES REQUESTED					ROUTINE ANALYTICAL SERVICES (RAS)							SPECIAL ANALYTICAL SERVICES (SAS)			TOTAL NO. OF BOTTLES PER SITE
CHEMISTRY TYPE					ORGANIC					INORGANIC		ORGANIC		INORGANIC	
SPECIFIC ANALYSES REQUESTED					TCL VOAS	TCL SEMI-VOAS (low conc.)	TCL SEMI-VOAS (med. conc.)	PESTICIDES & PCBs (low conc.)	PESTICIDES & PCBs (med. conc.)	TCL METAL (tot) (low conc.)	TCL METAL (tot) (med. conc.)	CYANIDE (low conc.)	METHOD 8010A/8020A		
PRESERVATIVES					Chill to 4°C add HCl to pH <2	Chill to 4°C	Chill to 4°C	Chill to 4°C	Chill to 4°C	Chill to 4°C add HNO <sub>3</sub> to pH <2	Chill to 4°C add HNO <sub>3</sub> to pH <2	Chill to 4°C add NaOH to pH >12	Chill to 4°C add HCl to pH <2		
ANALYTICAL HOLDING TIME(S)					Hold <14 days	Hold <7 days prior to extraction 40 days after extraction	Hold <7 days prior to extraction 40 days after extraction	Hold <7 days prior to extraction 40 days after extraction	Hold <7 days prior to extraction 40 days after extraction	Hold to <6 months [28 days for Hg]	Hold to <6 months [28 days for Hg]	14 days	Hold <14 days		
CONTRACT HOLDING TIME(S)					Hold <10 days	Hold <5 days prior to extraction 40 days after extraction	Hold <5 days prior to extraction 40 days after extraction	Hold <5 days prior to extraction 40 days after extraction	Hold <5 days prior to extraction 40 days after extraction	Hold <35 days [26 days for Hg]	Hold <35 days [26 days for Hg]	12 days	Hold <10 days		
SAMPLE × SAMPLE					No. OF BOTTLES PER ANALYSIS	No. OF BOTTLES PER ANALYSIS	No. OF BOTTLES PER ANALYSIS	No. OF BOTTLES PER ANALYSIS	No. OF BOTTLES PER ANALYSIS	No. OF BOTTLES PER ANALYSIS	No. OF BOTTLES PER ANALYSIS	No. OF BOTTLES PER ANALYSIS	No. OF BOTTLES PER ANALYSIS	No. OF BOTTLES PER ANALYSIS	
SAMPLE NUMBER	SAMPLE LOCATION	SAMPLING SCHEDULE	CONCENTRATION		2 × 40 ml glass vials	2 × 1 liter amber glass bottles	2 × 32 oz wide-mouth glass jars	2 × 1 liter amber glass bottles	2 × 32 oz wide-mouth glass jars	1 × 1 liter polyethylene bottle	1 × 16 oz wide-mouth glass jar	1 × 1 liter polyethylene bottle	3 × 40 ml glass vials		
			LOW	MED.											
1	EB-01	Week of 12/20	X							1		1	3		5
2	EB-02	Week of 12/20	X							1		1	3		5
3		Week of /													
4		Week of /													
5		Week of /													
6		Week of /													
7		Week of /													
8		Week of /													
9		Week of /													
10		Week of /													
Total Low Concentration										2		2	6		10
Total Medium Concentration															

ANALYSES REQUESTED  
MATRIX = SOIL GAS

TABLE 7

CHEMISTRY TYPE					ORGANIC	TOTAL NO. OF BAGS PER POINT
SPECIFIC ANALYSES REQUESTED					8010/8020	
PRESERVATIVES					Keep out of light	
ANALYTICAL HOLDING TIME(S)					Hold 3 days	
SAMPLE × SAMPLE					NO. OF BAGS PER ANALYSIS	
SAMPLE NUMBER	SAMPLE LOCATION	SAMPLING SCHEDULE	CONCENTRATION		1 × 1 liter tedlar bag	
			LOW	MED.		
1	P-1	Week of 12/20	X		1	1
2	P-2	Week of 12/20	X		1	1
3	P-3	Week of 12/20	X		1	1
4	P-4	Week of 12/20	X		1	1
5	P-5	Week of 12/20	X		1	1
6	P-6	Week of 12/20	X		1	1
7	P-7	Week of 12/20	X		1	1
8	P-8	Week of 12/20	X		1	1
9	P-9	Week of 12/20	X		1	1
10	P-10	Week of 12/20	X		1	1
11	P-11	Week of 12/20	X		1	1
12	P-12	Week of 12/20	X		1	1
13	P-13	Week of 12/20	X		1	1
14	P-14	Week of 12/20	X		1	1
15	P-15	Week of 12/20	X		1	1
16	P-16	Week of 12/20	X		1	1
17	P-17	Week of 12/20	X		1	1
18	P-18	Week of 12/20	X		1	1
19	P-19	Week of 12/20	X		1	1
20	P-20	Week of 12/20	X		1	1
21	P-21	Week of 12/20	X		1	1

(continued on next page)



ANALYSES REQUESTED  
MATRIX = SOIL GAS

Page 2 of 2

TABLE 7

CHEMISTRY TYPE					ORGANIC	TOTAL NO. OF BAGS PER POINT
SPECIFIC ANALYSES REQUESTED					8010/8020	
PRESERVATIVES					Keep out of light	
ANALYTICAL HOLDING TIME(S)					Hold 3 days	
SAMPLE × SAMPLE					No. OF BAGS PER ANALYSIS	
SAMPLE NUMBER	SAMPLE LOCATION	SAMPLING SCHEDULE	CONCENTRATION		1 × 1 liter tedlar bag	
			LOW	MED.		
22	P-22	Week of 12/20	X		1	1
23	P-23	Week of 12/20	X		1	1
24	P-24 (duplicate P-14)	Week of 12/20	X		1	1
25	P-25 (duplicate of P-22)	Week of 12/20	X		1	1
26	P-26 (ambient air)	Week of 12/20	X		1	1
27	EB-27 (system blank)	Week of 12/20	X		1	1
Total Low Concentration					27	27
Total Medium Concentration						

## VI. FIELD METHODS AND PROCEDURES

### A. Soil Sample Collection Procedures

#### A.1 Access to the Site

Access to the PFE property will not be a problem. The director of the compliance division of the consulting department of Southern Pacific Environmental Systems (SPES) has been informed of the impending sampling and permission has been granted to enter the site. The director of the compliance division of SPES as well as the general manager of PFE will be notified by mail of the sampling dates. Sampling schedules will be confirmed with both persons by phone a few days prior to sampling.

#### A.2 Safety Survey

Blue stake, a service to determine underground electrical, natural gas and telephone line locations will be performed prior to any sampling activities. In addition, an underground locating service will be used to confirm the absence of subsurface structures beneath the proposed locations targeted for collection of the soil samples and soil gas samples. An initial safety survey of the sampling locations will be performed upon site entry. At that time, the proper level of protection necessary for field operations will be determined. Sampling locations will be monitored continuously with an HNU while sampling.

#### A.3 Soil Sampling Procedures

The Geoprobe unit is a hydraulically powered hammer/ram sampling device. The hydraulic unit, with percussion hammer, is capable of exerting 15,000 pounds of downward force. The weight of the vehicle contributes the majority of the force. The hydraulic system pushes 3 foot lengths of specially modified 1/2 inch inside diameter (ID), 1 inch outside diameter (OD) hardened steel rod into the ground. The rod is advanced to depth by adding 3 foot lengths of rod until the desired sampling depth is achieved. A Draft Standard Operating Procedures for Geoprobe, Prepared by Ecology and Environment, Inc., January 1990, is included as Appendix B.

Subsurface soil samples are collected with a Geoprobe Large Bore Sampler which is a nickel plated sample tube that recovers a 24 inch long, 1 1/8 inch diameter sample of 400 milliliters (ml) in an acetate liner. The sample is obtained by inserting the piston tip, piston rod drive-head and piston stop-pin into the sampling tube. This assemblage is pushed into the ground by the hydraulic system. When the desired depth is reached, extension rods are used to extract the piston stop-pin which allows the piston rod and piston tip to retract as the sample tube is driven an additional two feet to obtain the sample. Once the sample is obtained, the probe rods and the sampling apparatus are removed from the hole. Holes created by the sampling probes will be back-filled with bentonite grout.

#### A.4 Soil Sample Collection

The soil sampling and sample handling procedures which will be employed are as follows:

- 1) All soil sampling equipment which comes into contact with soils on site must be cleaned in accordance with the procedures in Appendix C taken from the Quality Assurance Project Plan dated May 1991. The Quality Assurance Project Plan recommends the use of acetone in the triple rinse procedure. However, because acetone is a compound on the TCL, an exception will be made and hexane will be substituted for acetone.
- 2) Sampling personnel must wear a clean pair of gloves at each sampling location.
- 3) An equipment blank will be collected from the soil sampling portion of the Geoprobe equipment before any of the sampling equipment is introduced to the soil. The soil sampler being used, a Geoprobe Large Bore Sampler, has a removable acetate liner. Equipment blanks will be collected through the acetate liner. The blank will determine whether there is any contamination present within the liner. The equipment blank will be submitted for analyses as a rinsate sample during this sampling event.
- 4) One member of the sampling team will record field measurements (location of sample points with respect to known locations on site, depth of sample, sample characteristics, etc.) while two other members of the team collect and remove the sample from the Geoprobe soil sampling equipment.
- 5) Sufficient sample material will be collected so that all of the parameters can be analyzed. The order of sample collection will be determined by the degree of volatility for each parameter. In this case, only VOC samples will be collected.

#### A.5 Soil Sample Extraction and Preparation

Sample cores extracted with the Geoprobe Large Bore Sampler are encased in an acetate liner or sleeve. Sleeves are sealed with teflon sheeting, aluminum foil and capped with vinyl end caps immediately after sampling. Cores will be examined for color, texture, or any other unusual features. Descriptions of the cores will be noted in the field notebook. The length of the core will be measured as well as the depth of any textural changes noticed in the core. Any evidence of soil discoloration will be recorded in the notebook. Each sample will be labeled with the sample location number, CLP sample number, date, time and depth as well as requested analyses. Samples collected in this manner will be placed on ice and shipped directly to the lab.

## B. Soil Gas Sample Collection Procedures

### B.1 Soil Gas Sampling Procedures

Soil gas samples will be collected using the Geoprobe equipment in the following manner. A retractable drive point (RDP) is placed into the female end of the probe rods. The probe rods are driven into the ground until the target depth is attained. One eighth inch ID disposable polyethylene tubing is then attached to a tubing adapter. Teflon tape may be used to secure the adapter if the tubing does not make a tight fit. The tubing adaptor and tubing are then lowered through the probe rods until the adaptor can be screwed into the RDP release mechanism, allowing the RDP to separate from the probe rods. The probe rod assemblage is then pulled up approximately one foot, releasing the RDP, and forming a void from which the soil gas sample can be collected. A Pelican Mini D Case sampling vessel provides the vacuum chamber, allowing for collection of the soil gas sample. The Tedlar bag is placed within the sampling vessel. The polyethylene tubing is passed through the smaller of the two fittings on the cover of the vessel, attached to the Tedlar bag, and the vessel is sealed. The larger fitting on top of the vessel is connected to the Geoprobe pump. As the Geoprobe pump begins pumping, a vacuum forms inside the vessel, resulting in the Tedlar bag filling with the soil gas sample. When the Tedlar bag is filled, the Geoprobe pump is turned off, the sampling vessel is opened, and the Tedlar bag is retrieved and labeled appropriately. The polyethylene tubing is removed from the tubing adapter and discarded. The probe pipe is then removed from the ground, the RDP replaced with the piston tip, the piston rod drive head and the piston stop pin, and the soil sample is collected as previously described. Following retrieval of the soil sample, the hole is then sealed with bentonite grout.

A minimum of three times the volume of air in the tubing will be removed prior to sample collection. The following formula will be used to calculate the volume of air in the tubing:

$$V = h(\pi r^2) K, \text{ where}$$

V = volume in cubic centimeters

h = total length of tubing and tubing adapter, in inches

$\pi = 3.1416$

r = inside radius of the tubing, in inches

K = conversion factor (cubic inches to cubic centimeters), 16.387

### B.2 Soil Gas Sample Collection

The soil gas sampling and sample handling procedures which will be employed are as follows:

- 1) All reusable soil gas sampling equipment will be decontaminated prior to use at each individual sampling location.
- 2) Sampling personnel must wear a clean pair of gloves at each sampling location.
- 3) One system blank will be collected before the soil gas apparatus is introduced to the soil. This blank will consist of ultra pure air or nitrogen, the analysis of which will determine whether the apparatus is free of contamination prior to sampling.

- 4) A sample of the ambient air will be taken near the ground surface in a location where on-site activities involve the use of hazardous substances. This sample will be used to determine the potential for cross contamination.
- 5) One member of the sampling team will record field measurements (location of sample point, depth of sample, sample time, etc.) on the Soil Gas Data Sheet included in Appendix D. Two other team members will collect the sample from the Geoprobe equipment.
- 6) One liter of soil gas will be collected in a Tedlar bag at each sample location.

The FASP procedures in Collection of Gaseous Samples Using Tedlar bags, SOP F93012 have been reviewed and are considered acceptable.

#### C. Disposal of Contaminated Materials

It is not anticipated that any contaminated equipment or supplies will require special disposal as hazardous wastes. Gloves will be disposed of in a City of Tucson dumpster. Hexane will be contained in a plastic bucket, labeled as such, and evaporated on site.

Decontamination rinse water, which is not expected to be contaminated with levels above State of Arizona Health Based Guidance Levels (HBGLs), will be collected and evaporated on the property.

With the Geoprobe equipment, sampling is accomplished by the insertion of an open ended probe into the soil. This does not generate cuttings, and therefore will not require containerization of such.

#### D. Equipment Decontamination

Decontamination of all field equipment will be completed prior to use at the individual sample locations. Decontamination procedures for all sampling equipment will follow the procedures identified in the Quality Assurance Project Plan (Appendix C). The probe rods from the Geoprobe will be steam cleaned prior to use at the individual sample locations. The remainder of the Geoprobe sampling assemblage (the cutting shoe, steel sample sleeve, piston stop, etc.) will be rinsed with tap water and scrubbed with a stiff brush to dislodge all obvious mud, dirt and debris. It will then be washed using Alconox detergent, rinsed with tap water, rinsed with organic free (HPLC grade) distilled water, rinsed with hexane, and finally rinsed again twice more with the HPLC grade distilled water.

The (new) acetate liners used within the Geoprobe large bore sampler will also be decontaminated as described above prior to use, due to the fact that the liners are not certified to be free from contamination upon receipt from the manufacturer.

The Tedlar bags used to collect soil gas samples will be decontaminated after collection of each individual sample, as follows:

- If no contaminants were detected during the previous use, the Tedlar bag will be flushed

once with ultra pure nitrogen (or its equivalent).

- If contaminants were detected during the previous use, the Tedlar bag will be flushed three times with ultra pure nitrogen (or its equivalent), and the contents from the last flush will be analyzed. If no contaminants are detected, the bag will be reused.
- If contaminants are still present after three flushings with ultra pure nitrogen, the bags will be heated in a vacuum oven under reduced pressure for 30 minutes. The bags will then be removed, filled with ultra pure nitrogen (or its equivalent), and re-analyzed. If contaminants are still present, the bag will be discarded.

#### E. Sample Containers

Acetate liners for the Geoprobe Large Bore Sampler and 40 ml glass vials for the equipment blanks (rinsate samples) are all that is required for soil sample collection. The acetate liners are supplied by the makers of the Geoprobe equipment. The 40 ml glass vials will be provided to the ADEQ sampling team from the CLP bottle repository. Appendix E includes sample container types, volumes, and materials to be employed in this sampling effort. Necessary sample containers are described in Tables 4 and 5.

Soil samples obtained by the Geoprobe large bore sampler will not require separate containers other than the acetate liners. These samples will be submitted to the laboratory in the acetate liners which will be covered at the ends with teflon sheets, aluminum foil and vinyl caps.

For the VOC equipment blank, a 120 ml aliquot is required by the CLP. It will be collected by filling three, 40 ml glass vials (having Teflon septum caps) with organic free (HPLC grade) distilled water. All of the 40 ml vials will be carefully examined to ensure they are free of headspace, prior to submittal. For the Total Metals and Cyanide equipment blank a one liter polyethylene bottle is required by the CLP. A lack of headspace is not critical for the inorganic equipment blank.

Soil gas samples will be collected in one liter Tedlar bags.

#### F. Sample Preservation and Handling Procedures

Preservation by acidification (pH less than or equal to 2) of low concentration water samples is required by EPA Region IX for organic RAS and SAS analyses. Consequently, prior to collection of the rinsate sample (equipment blank), a concentration of 1:1 HCL will be added, one drop at a time, to a 40 ml glass vial (obtained from the CLP bottle repository) of organic free, HPLC grade, distilled water until a pH of 2 or less is obtained. Another vial will be thus treated, using the same number of drops of acid, and the pH tested to ensure it is again less than or equal to 2. Once this has been accomplished, these test vials of acid-preserved water will be discarded. The same number of drops of acid will then be added to each 40 ml vial of the rinsate sample. All samples will be chilled to 4° C in coolers immediately upon collection. The same basic procedure will be followed to ensure a pH of less than 2 is attained for the equipment blank for the RAS Total Metals and Cyanide analysis. The inorganic rinsate sample will also be chilled to 4° C in coolers immediately upon collection.

Soil samples are not chemically preserved but will be chilled after collection. All samples will be chilled to 4° C in coolers immediately upon collection.

Soil gas samples will be kept out of direct sunlight until they are analyzed on-site by the FASP lab.

Sample treatment and preservation, as well as analytical and CLP holding times for RAS and SAS parameters, are given in Appendix F. To avoid exceeding hold times, all appropriate samples will be sent to the CLP laboratory by Airborne Express to ensure overnight delivery.

#### G. Sample Shipment

All samples will be shipped in coolers with appropriate traffic reports or sample ID labels, chain-of-custody seals and chain-of-custody forms. Each individual bottle or soil container will have a chain-of-custody seal around its cap. The sample ID labels will be written in waterproof ink and taped to the container to prevent them from loosening or becoming illegible when wet. The samples will be securely packaged and sealed in plastic bags. The forms will be packaged in a waterproof plastic bag and securely taped to the underside of the cooler lid. Empty space in the cooler will be filled with material to cushion the samples and prevent breakage during shipment. Samples will be shipped on the same day that they are collected. Coolers used for shipping will be securely taped shut and a chain-of-custody seal will be placed across the lid in two places. The ice placed in the coolers for shipment will be double bagged. Copies of all required field data forms and CLP paperwork instructions are included in Appendix D.

All shipments of samples will be reported daily to the EPA Region IX Regional Sample Control Coordinator (RSCC). This notification will include such information as the legal description of sampling locations, facility name, case number, total number of samples shipped, CLP laboratory, carrier and method of shipment, date and any special handling requirements or anticipated problems.

#### H. Sample Documentation

Sample documentation involves the entry of data into log books and the generation of field data records, chain-of-custody forms and sample data sheets.

##### H.1 Field Notebooks

Each member of the ADEQ sampling team will document all field activities of the day in a bound, Teledyne log book. Data entries will be legible and recorded with waterproof ink. All pertinent information such as sampling locality, time and date of sampling, time of field measurements, weather conditions, calculations, safety precautions and observations or comments will be recorded.

##### H.2 Field Data Sheets

The field data sheets will be filled out by the ADEQ sampling team during the course of the sampling. These forms will be submitted to EPA Region IX. Copies of field data sheets are

included in Appendix D.

### H.3 Sample Traffic Reports, Sample Data Sheets and Chain-of-Custody Records

The collection of each sample will be documented on organic traffic reports. The top copy will be sent to the Sample Management Office, and the second copy will be sent to EPA Region IX. The third and forth copies of these forms will be sent with the samples to the appropriate laboratory.

All samples will be sent through chain-of-custody procedures as per NEIC Policies and Procedures; EPA publication #33019-78-001-R. The original record will accompany the shipment and copies will be sent to the Region IX RSCC. Until transferred, custody and security will be the responsibility of the ADEQ sampling team. Each separate sample container or bag of sample containers will be sealed with a gummed custody seal prior to shipment. Samples will then be placed in coolers which will be securely taped shut and sealed with a gummed custody seal. Chain-of-custody is satisfied when the samples arrive at the CLP laboratory with the seals intact and after the form has been signed by lab personnel.

Soil gas samples will be collected by the ADEQ sampling team. Until transferred to the FASP lab, custody and security will be the responsibility of the ADEQ sampling team. Chain-of-custody is satisfied when the soil gas sample is delivered to FASP laboratory personnel and the chain-of-custody form is signed by a member of the ADEQ sampling team and FASP laboratory personnel.

### H.4 Labeling and Packaging

Each sample will be labeled with the sample location number, CLP sample number, date, time, depth, and requested analysis. In addition, the samples collected by the Geoprobe large bore sampler will be marked with an arrow on the acetate tube indicating the bottom of the sample interval.

## I. Quality Assurance/Quality Control

To assure the quality of data obtained during the sampling phase of the SI, several types of QC samples will be collected and analyzed. These are as follows:

- \* Duplicates
- \* Blanks
- \* Background
- \* Laboratory QC samples

### I.1 Duplicate Samples



One duplicate sample will be collected for each parameter group for every ten samples collected. The duplicate samples will then be included in the set of regular samples and submitted to the analytical laboratories.

Duplicate soil samples will be collected at sample locations P-14 (near the former location of the western-most incinerator ash pile) and P-22 (the west side of the hazardous materials storage area), and labeled P-24 and P-25, respectively. These particular locations were selected based upon the supposition that contamination is likely to be present in these areas. The duplicates will be obtained by boring an additional hole as close as possible to the borings for P-14 and P-22. Duplicate soil gas samples will also be collected near P-14 and P-22, and also labeled P-24 and P-25. They will be collected from the same borings and prior to collection of the duplicate soil samples. It is noted that all QC samples including duplicates, blanks, background and lab QC samples are submitted for analysis in the same manner as the other field samples with no distinguishing marks or labels. QC samples will be submitted for all RAS and SAS parameters requested.

## I.2 Blanks

Quality Control (QC) blanks are recommended as safeguards against laboratory and field contamination of samples. For this sampling event they consist of:

- \* Equipment blanks

Analysis of the equipment blank indicates if contamination is introduced by the soil sample collection equipment. After the equipment is decontaminated, a quantity of certified organic-free water is passed through the acetate liner and three, 40 ml aliquots are collected for the VOC analysis.

One equipment blank per day per TCL will be collected from the Geoprobe soil sampling equipment prior to sampling and designated EB-01 and EB-02. The blank will be submitted to the CLP lab for analysis as a rinsate sample. Ultra-pure air or nitrogen will be used to take an equipment blank with the Geoprobe soil gas sampling equipment. The soil gas equipment blank will be labeled EB-27.

## I.3 Background Sample

A background sample provides evidence of ambient soil conditions for the area surrounding the site. Both background soil samples will be collected at the same depth as the regular samples (10-12 ft bls) at an on site location where contamination is unlikely (based upon historical aerial photos which indicate a minimum of activity to have occurred at these locations). They will be labeled P-1 and P-2, and will be collected at the northwest corner of the property, along the east and west sides of the balloon track.

In addition, two background soil gas samples will also be collected at these same locations and at the same depth as the regular soil gas samples collected from within the site. They will also be labeled P-1 and P-2.

Laboratory Quality Control samples are analyzed by the EPA contract laboratory as part of the CLP standard laboratory quality control protocols. A spike is added to these samples to determine the reproducibility of the test methods and effectiveness of quantitative techniques used in the CLP lab. The container labels, traffic reports and chain-of-custody for these samples will identify them as those selected for laboratory QC. The soil QA/QC samples will be collected at sample locations P-11 and P-21, based upon moderate contamination which is suspected to be present in this area of the site.

## VII.

SITE SAFETY PLANSite Name: Pacific Fruit Express

## A. Health and Safety Considerations

<u>Area of Concern</u>	<u>Hazard Potential</u>			<u>Precautions</u>
	<u>Low</u>	<u>Med</u>	<u>High</u>	
Explosion:	<u>X</u>	—	—	
02 Deficiency: (e.g. Confined Spaces)	<u>X</u>	—	—	
Radiation:	<u>X</u>	—	—	
Toxic Gases:				
a. General (HNU meter)	<u>X</u>	—	—	<u>No Toxic gases believed to be present</u>
b. Specific: (e.g. Sorbent Detector Tube)	<u>X</u>	—	—	
Skin/Eye Contact:	<u>X</u>	—	—	<u>Level D Protection</u> <u>Disposable Gloves</u>
Heat/Cold Stress:	—	—	<u>X</u>	<u>Provide adequate water</u>
Falling Objects: (e.g. Stacked barrels, etc.)	<u>X</u>	—	—	
Falls: (e.g. pits, ponds, elevated work place, etc.)	<u>X</u>	—	—	<u>Steel-toe boots, hardhats</u>
Confined Spaces: (e.g. manholes, vaults, closed rooms, trenches, etc.)	<u>X</u>	—	—	
Mechanical:	<u>X</u>	—	—	<u>Normal precautions when working with</u>
Electrical:	<u>X</u>	—	—	<u>mechanical and electrical equipment</u>

**B. Acute Exposure Symptoms of Compounds Present or Suspected. For specific compounds, reference material is available from the Health & Safety Officer).**

Compound	STEL, TLV, etc.	Symptoms	First aid
Hexane	IDHL 5000 ppm	Hallucinations, Vertigo, Drowsiness, Fatigue, polyneuropathy	Remove to fresh air
1,1,1-trichloroethane (aka methyl chloroform)	PEL, TLV 350 ppm REL 350 ppm ceiling STEL 450 ppm IDLH 1000 ppm	Headache, lassitude, CNS depressant poor equilibrium irritation of eyes dermatitis cardiac arrhythmias	Eye: Irr immed Skin: Soap wash prompt Breath: Resp support Swallow: Medical attention immediately
Trichloroethene	PEL, TLV 50 ppm REL carcinogen 25 ppm STEL 200 ppm IDLH carcinogen 1000 ppm	Headache, vertigo; visual disturbance, tremors, somnolence, nausea vomit; irritation of eyes; dermatitis; cardiac arrhythmias, paresthesia	Eye: Irr immed Skin: Soap wash prompt Breath: Resp support Swallow: Medical attention immediately
Tetrachloroethene	TWA 25ppm IDLH carcinogen 500 ppm	irritation of eyes, nose, throat, headache, vertigo, somnolence, nausea, irritation of eyes, skin irritant, Liver damage	Eye: Irr immed Skin: Soap wash prompt Breath: Resp support Swallow: Medical attention immediately
References:NIOSH Pocket Guide to Chemical Hazards, June 1990			

**C. Overall Hazard Assessment (Toxicity, flammability, reactivity, stability, operational hazards with sampling, decontamination, etc.)**

Sampling will be conducted at a commercial property. It is not anticipated that any hazardous conditions exist.

Level of Protection Needed: A \_\_\_\_\_ B \_\_\_\_\_ C \_\_\_\_\_ D X

Note: For level "C" protection and higher, review and approval of this Site the ADEQ Health & Safety Officer.

Safety plan is required by

#### D. Equipment and Procedures

1. Hazard Surveillance Equipment & Materials: HNU meter will be used to monitor air levels prior to and during sampling.
2. Entry Procedures: Level D protection. Entry to property is coordinated with property owners and occupants.
3. Special Equipment, Materials, Procedures, (Note: Level "D" basic supplies are required as per ADEQ "Personnel Safety Manual"):  
Level D supplies as per ADEQ Safety Manual, Decon water, first aid kits, Fire extinguisher and disposable gloves.
4. Decontamination Equipment & Procedures: (as they relate to health & safety) Use of Hexane in spray bottle for decontamination of equipment.
5. Disposal Procedures (contaminated equipment, supplies, etc.):  
It is not anticipated that any contaminated equipment or supplies will need to be disposed of. Gloves will be disposed of in a City of Tucson dumpster. Hexane will be contained in a plastic bucket, labeled as such, and evaporated on site.

#### E. Emergency Information

1. Nearest Hospital Emergency Room: University Medical Center  
Address: 1501 N. Campbell Telephone: 694-0111
2. Emergency Telephone Numbers:
  - a. Fire 911
  - b. Police 911
  - c. Ambulance 911
3. Poison Management Center, St. Lukes Hospital: 1-800-362-0101
4. Arizona Radiation Regulatory Agency: 1-602-255-4845

#### F. Approvals

1. Safety Plan Prepared by: John Robertson Date: 11-05-93
2. Supervisor/Title: Glenn Koroghlanian Date: 11/12/93  
for JH
3. ADEQ Health & Safety Officer: \_\_\_\_\_ Date: \_\_\_\_\_  
(Not required for level D)

**TABLE 8. ATMOSPHERIC HAZARD GUIDELINES**

<b>Monitoring Equipment</b>	<b>Hazard</b>	<b>Level</b>	<b>Ambient Action</b>
<b>Monitoring Equipment</b>	<b>Hazard</b>	<b>Ambient Level</b>	<b>Action</b>
Combustible gas indicator	Explosive atmosphere	10% LEL	Continue investigations
		10-25%	Continue on-site monitoring with extreme caution as higher levels are encountered.
		25%LEL	Explosion hazard; withdraw from area immediately.
Oxygen concentration meter	Oxygen	19.5%	Monitor wearing SCBA. NOTE: Combustible gas readings are not valid in atmospheres with less than 19.5% oxygen.
		19.5-25%	Continue investigation with caution. SCBA not needed, based on oxygen content only.
Radiation Survey	Radiation	1 mR/hr	Continue investigation. If radiation is detected above back-ground levels, this signifies the presence of possible radiation sources; at this level, more thorough monitoring is advisable. Consult with a health physicist.
		10mR/hr	Potential radiation hazard; evacuate site. Continue monitoring only upon the advice of a health physicist.
Colorimetric tubes	Organic and inorganic vapors/gases	Dependent upon species	Consult standard reference manuals for air concentrations/toxicity data.
HNU photoionizer	Organic vapors/gases	1) Dependent upon species	Consult Standard reference manual for air concentration/toxicity data.
		2) Total response mode	Consult EPA Standard Operating Procedures.
Organic vapor analyzer	Organic vapors/gases	1) Dependent upon species	Consult Standard reference manuals for air concentrations/toxicity data.
		2) Total response mode	Consult EPA Standard Operating Procedures.

Note: Reference - Interim Standard Operating Safety Guides, Office of Waste Management, Hazardous Response Support Division, Revised 1987.

**APPENDIX A**

**SPECIAL ANALYTICAL SERVICES, CLIENT REQUEST FORM**



U. S. ENVIRONMENTAL PROTECTION AGENCY  
CLP Sample Management Office  
P. O. Box 818 - Alexandria, Virginia 22313  
Phone: 703/557-2490; FTS/557-2490

SAS Number

Modified? ☒ YES ☐ NO

SPECIAL ANALYTICAL SERVICES

Client Request

☐ Regional Transmittal

☐ Telephone Request

- A. EPA Region/Client: Region 9
- B. Region Contact: RSCC Coordinator, ESAT, (415) 882-3069
- C. Date of Request: 11/10/93
- D. Site Name: Pacific Fruit Express
- E. City/State: Tucson AZ
- F. 2 Digit Superfund Site Identifier:

Please provide below a description of your request for Special Analytical Services under the Contract Laboratory Program. In order to most efficiently obtain laboratory capability for your request, please address all applicable questions. Incomplete or erroneous information may result in a delay in the processing of your request. If you need to provide additional information not addressed by the questions, please attach additional sheets of paper.

1. General description of analytical service requested:

The analysis of low and/or medium concentration water and/or soil samples for purgeable halocarbons and aromatics by SW846 Methods 8010A and 8020A (Revision 1, November 1990), respectively, with the addition of trichlorotrifluoroethane with the following detection limits:

- 0.5 ug/L (water) & 1.0 ug/L for soil.
2. Definition and number of work units involved (specify whether whole samples or fraction; whether organics or inorganics; whether aqueous or soil and sediments; and whether low, medium or high concentration):
3. Purpose of analysis (specify whether Superfund [enforcement or remedial action], RCRA, NPDES, etc.):

4. Estimated date(s) of collection (provide a sampling schedule):

5. Estimated date(s) and method of shipment:

*Airborne*

~~Express~~ - shipped same day as collection for next day delivery.

6. Number of days analysis and data required after laboratory receipt of samples:

The contract required analysis holding time is ten (10) days from the date of sample receipt by the laboratory.

*35*

Data packages and all other deliverables are required within ~~35~~ *35* days from receipt of last sample in each Sample Delivery Group (SDG). A SDG is defined as all samples received within a 14 day period or 20 samples, whichever is reached first.

7. Analytical protocol required (attach copy if other than a protocol currently used in this program):

- a. Follow SW846 Method 5030A (Revision 1, November 1990) for sample introduction by purge-and-trap. Sample introduction by direct injection is not an option, unless prior approval has been received from the Region.
- b. Follow SW846 Methods 8010A and 8020A (Revision 1, November 1990) for gas chromatographic analysis (GC) analysis.
- c. The use of a halogen-specific detector, such as a Hall Electrolytic Conductivity Detector (HECD), is required for the analysis of purgeable halocarbons by SW846 Method 8010A.
- d. The use of an aromatic-specific detector, such as a photoionization detector (PID), is required for the analysis of purgeable aromatics by SW846 Method 8020A.
- e. GC analysis by modified SW846 Method 8021 (Revision 0, November 1990) is acceptable, providing that all compounds listed in Table 1 are analyzed, and the detection limits and all other QC requirements specified in this document are met. Acceptable "modifications" include GC analysis with the HECD and PID detectors in series and use of a wide-bore capillary column.
- f. Whenever an unusually concentrated sample is analyzed, the analysis of reagent water to check for contamination by sample carry-over should follow.

8. Special technical instructions (if outside protocol requirements, specify compound names, CAS numbers, detection limits, etc.):

a. Calibration Procedure and Criteria:

Calibrate according to Sections 5.6 and 7.3 of SW846 Method 8010A, Sections 5.5 and 7.3 of SW846 Method 8020A, and Sections 7.4.2 and 7.5 of SW846 Method 8000, with the following specifications:

1. Five-point initial calibration curve with a low standard at 1.0 ng/mL is required. Sample quantitation is to be done using the average calibration factor (CF) from this initial calibration curve.

All calibration standards must have a signal-to-noise ratio of 5:1 or greater for all analytes of interest. If this requirement cannot be met for the low concentration standard, the laboratory must submit a Method Detection Limit (MDL) study as part of the data package, in order to validate its ability to achieve the contract required quantitation limits. The MDL is defined as the minimum concentration of a substance that can be measured and reported with 99% confidence that the value is above zero.

2. A continuing calibration at the concentration of 10 ng/mL for each analyte is to be analyzed at the beginning of each day and after each group of 10 samples.
3. Less than 20% relative standard deviation (%RSD) in calibration factors (CF) for the initial calibration standards, and less than a  $\pm 15\%$  difference (%D) between the CF for the daily continuing calibration and the average CF from the initial calibration, are required.

b. Internal Quality Control Checks, Control Limits and Corrective Actions:

1. Analyze method blanks after each continuing calibration analysis and after the analysis of unusually concentrated samples. The method blanks must contain less than or equal to the CRQL of the volatile target compounds listed in Table 1, except for methylene chloride which must be less than or equal to five times ( $5 \times \text{CRQL}$ ). If a method blank exceeds these criteria, the laboratory must consider the analytical system to be out of control. The source of the contamination must be investigated and appropriate corrective measures must be taken and documented before further sample analysis proceeds. All samples processed with a method blank that is out of control must be re-extracted/repurged and reanalyzed at no additional cost to

the Agency. The Laboratory Manager, or his/her designee, must address problems and solutions in the SDG narrative.

2. The following purgeable halocarbon surrogates must be spiked into all standards, samples, method blanks and QC samples (see Sections 5.8 and 8.3 of SW846 Method 8010A): bromochloromethane, 2-bromo-1-chloropropane and 1,4-dichlorobutane. Recoveries of 75-125% for water samples, and 60-125% for soil samples are required. The samples are to be reanalyzed if the surrogate recoveries are outside the QC limits. If reanalysis of the sample solves the problem, submit data only from the analysis in which surrogate recoveries are within QC limits. If reanalysis does not solve the problem, submit data from both analyses.
3. The following purgeable aromatic surrogates must be spiked into all standards, samples, method blanks and QC samples (see Sections 5.7 and 8.3 of SW846 Method 8020A): 1,1,1-trifluorotoluene and bromofluorobenzene. Recoveries of 75-125% for water samples, and 60-125% for soil samples are required. The samples are to be reanalyzed if the surrogate recoveries are outside the QC limits. If reanalysis of the sample solves the problem, submit data only from the analysis in which surrogate recoveries are within QC limits. If reanalysis does not solve the problem, submit data from both analyses.
4. Second column confirmation on a column with a different liquid phase is required for all positive results reported. Compounds that are detected on both the HECD and PID are not considered to be confirmed.
5. Samples containing one or more analytes at concentrations above the initial calibration range are to be diluted and reanalyzed. If sample dilution is necessary, the dilution must be adjusted so that the highest concentration analyte is determined at a concentration in the upper half of the calibration range. The laboratory must report the results and submit documentation for the analysis of both the diluted and undiluted sample.
6. Analyze matrix spikes and matrix spike duplicates (MS/MSD) at a frequency of one per sample delivery group. Use the compounds specified in SW846 Method 8240 for matrix spikes and spike at the level of the mid-point calibration standard. Recoveries of 75-125% for water samples, and 65-135% for soil samples are required, and the relative percent differences (RPD) between spike recoveries must be less than  $\pm 30\%$ .

7. The QC requirements listed above are the minimum required. It is impossible to address all analytical situations that might be experienced by a laboratory during the analysis of environmental samples. The laboratory is expected to adhere to good laboratory practices when analyzing samples. If the laboratory has questions concerning the analyses of samples not addressed in this document, the Region should be notified IMMEDIATELY (through the Sample Management Office).

c. Compound Names and CAS Numbers:

See Table 1

*with the addition of trichlorotrifluoromethane*

9. Analytical results required (if known, specify format for data sheets, QA/QC reports, Chain-of-Custody documentation, etc.) If not completed, format of results will be left to program discretion.

a. Data Calculations and Reporting Units:

1. Calculate the CF and the concentration of individual analytes using the equations in Sections 7.4.2 and 7.8.1 of SW846 Method 8000. The sample results are to be reported in the concentration units of micrograms per liter ( $\mu\text{g/L}$ ) for water samples and micrograms per kilogram ( $\mu\text{g/Kg}$ ) for soil samples.
2. All records of analysis, dilutions and calculations must be legible and sufficient to recalculate all sample concentrations and QC results. Include an example of the calculations in the data package.

b. Documentation and Deliverables:

Deliverables (in the form of a purge file - i.e., original documents) for each Sample Delivery Group shall include all deliverables required by the IFB, including, but not limited to:

1. All Sample Tracking Reports (i.e., signed SAS Packing Lists/Chain-of-Custody forms).
2. A copy of the SAS, as provided by SMO (so that any SMO changes will be known). Only the technical portion of the SAS is required.
3. Any telephone logs referring to the samples.
4. A Case Narrative, signed by the laboratory manager or his or her designee, certifying the accuracy and validity of all data reported and describing any problems encountered during the analyses and documenting their resolution(s).

5. Tabulated sample results on a modified CLP Form I, with units, and sample volumes clearly specified.
6. Surrogate result summaries, on a modified CLP Form II, with calculated percent recovery (%R) values.
7. Matrix Spike/Matrix Spike Duplicate (MS/MSD) result summaries, on a modified CLP Form III, with calculated percent recovery (%R) and relative percent difference (RPD) values.
8. Blank data on a modified CLP Form IV, with tabulated results, specifying which samples are associated with each blank.
9. Raw Sample data, including
  - a. Tabulated results
  - b. All sample data system printouts
  - c. Manual worksheets
10. Standards data, including:
  - a. Standards summaries, on modified CLP Forms VI and VII, with calibration factors and percent relative standard deviation (%RSD) values or percent difference (%D) values.
  - b. All standard data system printouts, with all compounds clearly identified. The standard areas and calibration factors used for quantitating initial calibration %RSDs and continuing calibration %Ds, should also be indicated.
11. Raw QC data, including:
  - a. Blank data, in chronological order:
    1. Tabulated results
    2. All blank data system printouts.
  - b. MS/MSD data, in chronological order:
    1. Tabulated results
    2. All MS/MSD data system printouts.
12. All computer printouts with integrated areas, peak heights, and calibration factors.
13. Bench sheets for sample preparation, indicating dates, times, methods of sample extraction/preparation, spiking solution identification and volumes/amounts added, instrument run time/date, etc.

14. A formula (including definitions) showing how the results were calculated, with an example of an actual calculation.
  15. Standards preparation logs, including the source and traceable lot numbers, and concentrations of all standards used for calibration and spiking.
  16. Dilution logs and percent solids for all samples.
10. Other (use additional sheets or attach supplementary information, as needed):

Attached is a copy of the "U. S. EPA Region 9 Laboratory QC Summary Report" form. This form is to be completed by the Laboratory Manager or his/her designee and submitted with each data package. The form is to reflect the conditions contained within the data package with which it is submitted. Laboratories may make additional copies of this form as needed.

11. Name of sampling/shipping contact:

Phone:

12. Data Requirements:

<u>Parameter</u>	<u>Contract Required Quantitation Limit</u>
8010A - water/soil	See Table 1
8020A - water/soil	See Table 1

13. QC Requirements:

<u>QC Required</u>	<u>Frequency of QC</u>	<u>Limits (% or Conc.)</u>
Matrix Spike/ Matrix Spike Duplicate	1 per SDG	75-125 %R (water) 65-135 %R (soil) <±30% RPD
Method Blanks	Daily	<CRQL

14. Action required if limits are exceeded:

If surrogate control limits are exceeded, take appropriate actions to identify the problem. After identifying the likely cause of the problem and taking corrective action if a matrix problem is not indicated, reanalyze the affected samples.



TABLE 1  
Target Compound List - EPA Method 8010A/8020A

8010A/8020A Compounds	CAS No.	CRQL	
		Water ( $\mu\text{g/L}$ )	Soil ( $\mu\text{g/Kg}$ )
Benzene <sup>1</sup>	71-43-2	2.0*	2.0*
Benzyl chloride	100-44-7	2.0	2.0
Bromobenzene	108-86-1	2.0	2.0
Bromodichloromethane	75-27-4	1.0	1.0
Bromoform	75-25-2	2.0	2.0
Bromomethane	74-83-9	3.0	3.0
Carbon tetrachloride	56-23-5	1.2	1.2
Chlorobenzene <sup>1</sup>	108-90-7	2.0*	2.0*
Chloroethane	75-00-3	5.2	5.2
2-Chloroethyl vinyl ether	110-75-8	1.3	1.3
Chloroform	67-66-3	0.5	0.5
Chloromethane	74-87-3	0.8	0.8
Dibromochloromethane	124-48-1	0.9	0.9
Dibromomethane	74-95-3	2.0	2.0
1,2-Dichlorobenzene <sup>1</sup>	95-50-1	4.0*	4.0*
1,3-Dichlorobenzene <sup>1</sup>	541-73-1	4.0*	4.0*
1,4-Dichlorobenzene <sup>1</sup>	106-46-7	3.0*	3.0*
Dichlorodifluoromethane	75-71-8	2.0	2.0
1,1-Dichloroethane	75-34-3	0.7	0.7
1,2-Dichloroethane	107-06-2	0.3	0.3
1,1-Dichloroethene	75-35-4	1.3	1.3
trans-1,2-Dichloroethene	156-60-5	1.0	1.0
Dichloromethane	75-09-2	1.0	1.0
1,2-Dichloropropane	78-87-5	0.4	0.4
cis-1,3-Dichloropropene	10061-01-5	3.4	3.4
trans-1,3-Dichloropropene	10061-02-6	3.4	3.4
Ethyl benzene <sup>1</sup>	100-41-4	2.0*	2.0*
1,1,1,2-Tetrachloroethane	79-34-5	0.3	0.3
1,1,1,2-Tetrachloroethane	630-20-6	0.3	0.3
Tetrachloroethene	127-18-4	0.3	0.3
Toluene <sup>1</sup>	108-88-3	2.0*	2.0*
1,1,1-Trichloroethane	71-55-6	0.3	0.3
1,1,2-Trichloroethane	79-00-5	0.2	0.2
Trichloroethene	79-01-6	1.2	1.2
Trichlorofluoromethane	75-69-4	2.0	2.0
1,2,3-Trichloropropane	96-18-4	1.0	1.0
Vinyl chloride	75-01-4	1.8	1.8
Xylenes <sup>1</sup>	N/A	2.0*	2.0*

N/A - Not Applicable

1 - 8020A Compounds

\* - CRQL determined on PID

U. S. EPA REGION 9  
LABORATORY QC SUMMARY REPORT  
INSTRUCTIONS

1. A separate form is to be completed and attached to the Regional copy (original) of each data package submitted. This form is to be placed directly behind the case narrative.
2. The Laboratory QC Summary Report form is to be completed by the Laboratory Manager, or his/her designee.
3. This form will be used to identify areas of non-compliance with the required QC limits that may result in resampling or reduction in payment.
4. Answers to questions are designed so that a YES answer indicates compliance and requires no further explanation. A NO answer indicates non-compliance and requires a short explanation. If a lengthy explanation is required (or desired), write See Case Narrative in the blank space and include the explanation in the case narrative.

U. S. EPA REGION 9  
LABORATORY QC SUMMARY REPORT

LABORATORY: \_\_\_\_\_

SAS #: \_\_\_\_\_

SUBMITTED BY: \_\_\_\_\_

# SAMPLES: \_\_\_\_\_

TITLE: \_\_\_\_\_

MATRIX: \_\_\_\_\_

ANALYSIS: PURGEABLE HALOCARBONS AND  
AROMATICS BY EPA METHODS  
8010A/8020A

DATE: \_\_\_\_\_

QC SUMMARY TABLE

QC PARAMETER	QC LIMITS	FREQUENCY
Laboratory Blank	<CRQL for all analytes	Daily
Initial Calibration (%RSD)	5-pt Calibration Curve <20% for all analytes	as needed
Continuing Calibration (%D)	10 ng/mL <±15% for all analytes	Beginning of each day & after every 10 samples
MS/MSD (%R)	75-125% (water) 65-135% (soil)	1 per SDG (1/20)
MS/MSD (RPD)	<±30% (water & soil)	1 per SDG (1/20)
Surrogates (%R)	75-125% (water) 60-125% (soil)	All standards, blanks, samples and QC samples

1. Were all samples analyzed within the contract required holding times of 10 days of sample receipt? YES NO
- a. If no, list the samples that were analyzed outside of the holding time.
- b. How many days outside of the holding time were these samples analyzed?

2. Were all samples analyzed within the technical holding times of 14 days from sample collection? YES NO
- a. If no, list the samples that were analyzed outside of the holding time.
- \_\_\_\_\_
- b. How many days outside of the holding time were these samples analyzed?
- \_\_\_\_\_
3. Were all samples received intact and in good condition? YES NO
4. Was the data package sent within 35 days from the receipt of the last samples in the SDG? YES NO
- a. If no, how many days late was the data package sent.
- \_\_\_\_\_
5. Were EPA Methods 8010A/8020A used to analyze these samples? YES NO
- a. If no, specify which method was used.
- \_\_\_\_\_
- b. If no, why was this method used? Who authorized its use?
- \_\_\_\_\_
- c. Was the approved method followed without modifications or deviations? YES NO
- d. If no, specify what the modifications or deviations were and who approved them.
- \_\_\_\_\_
6. Was a 5-point initial calibration curve run? YES NO
- a. If yes, when. \_\_\_\_\_
- b. If no, why not? \_\_\_\_\_

7. Did the initial calibration curve meet the QC requirement of <20% RSD for all analytes? YES NO

a. If no, specify the analyte(s) and %RSD(s) that were outside of the QC limits:

---

8. Was a continuing calibration standard run at the beginning of each day? YES NO

After every 10 samples? YES NO

a. If no, why not? 

---

9. Did the continuing calibration standards meet the QC requirement of <±15% D for all analytes? YES NO

a. If no, specify the analyte(s) and %D(s) that were outside of the QC limits.

---

10. Was the signal to noise ratio requirement of 5:1 met for all analytes in the initial and continuing calibrations? YES NO

11. Were laboratory blanks analyzed daily? YES NO

a. If no, at what frequency were blanks performed.

---

12. Was blank contamination, if any, <CRQL for all analytes? YES NO

a. If no, at what levels was the contamination present.

---

13. Specify surrogate(s) used. 

---

14. Did the surrogate recoveries meet the QC requirements of 75-125% for all water samples, and 65-125% for all soil samples? YES NO

a. If no, list the recoveries that were above this range.

b. If no, list the recoveries that were below this range.

c. How many non-compliant recoveries were caused by dilutions?

d. How many non-compliant recoveries were caused by matrix interferences?

e. Where samples reanalyzed to confirm matrix interference? YES NO

If no, why not?

15. Were MS/MSD analyses performed at a minimum frequency of 1 per SDG? YES NO

a. If no, why not?

16. Did the MS/MSD recoveries meet the QC requirements of 75-125% for water samples, and 65-135% for soil samples for all spike compounds? YES NO

a. If no, specify the analyte(s) and %R(s) that were outside of the QC limits.

17. Did the MS/MSD meet the QC requirement of  $\leq \pm 30\%$  RPD for all spike compounds? YES NO

a. If no, specify the analyte(s) and %RPD(s) that were outside of the QC limits.

18. Were the CRQLs met for all analytes? YES NO
- a. If no, why not? \_\_\_\_\_
19. Was it possible to analyze all analytes within the initial calibration range? YES NO
- a. If no, were these samples diluted according to the instructions in Section 8.b.5 of the SAS request? YES NO
- b. List these samples and the associated analytes.
- \_\_\_\_\_
- c. If samples requiring dilution were not diluted, explain why not and list these samples.
- \_\_\_\_\_

**APPENDIX B**

**DRAFT STANDARD OPERATING PROCEDURES FOR THE GEOPROBE<sup>1</sup>**

<sup>1</sup> Prepared by Ecology and Environment, Inc., January, 1990





ecology and environment, inc.

Title: SOP - RESPONSE OPERATION

Category:

Revised:

Approved:

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STANDARD OPERATING PROCEDURE  
FOR  
RESPONSE OPERATION

REVISED:

Prepared by

Ecology and Environment, Inc.  
368 Pleasantview Drive  
Lancaster, New York 14086



Title: SOP-AERIAL PHOTOGRAPH INTERPRETATION

Category: CENTECH-4-12

Revised: January 1990

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## SECTION 1: INTRODUCTION

### 1.1 SCOPE

This document provides basic guidelines regarding the application and operation of the Geoprobe Model 8A van-mounted hydraulic sampling device, for use as an investigative technique in evaluating subsurface conditions at hazardous waste sites. It is intended to serve as the Standard Operating Procedure (SOP) for the Geoprobe when used as a site assessment tool. Specific information regarding data interpretation for soil-gas samples can be found in the SOP for Soil-Gas. Procedures for handling soil and water samples can be found in the SOP for FIT Field Sampling Procedure.

### 1.2 APPLICATIONS

The Geoprobe was designed to allow a convenient, cost-effective, and safe method for conducting soil-gas surveys, and for collecting subsurface samples from the soil and water matrices. The hydraulic unit with percussion hammer is capable of exerting 15,000 pounds of downward force; the weight of the vehicle contributes the majority of the force.

The Geoprobe unit is equipped with specialized tools; each are better suited to certain types of physical settings and subsurface conditions. In addition, the specialized equipment determines the effective investigative depth. It is, therefore, imperative that the soil conditions and stratigraphy beneath the site be thoroughly re-searched before use of the Geoprobe, to assure that it is the most effective investigative technique.

Specialized equipment, the primary applications, and depths are briefly outlined below.

Well Points: Best suited for sandy conditions, and particularly applicable in alluvial floodplains; very poor performance in clays. Due to physical properties of gravity, ground water collection with a pump is limited to 30 to 32 feet.

Shelby Tubes: Best performance in silt/clay; poor results in sand, and ineffective in gravelly conditions. Maximum depth of six feet.

Soil-Gas: Best performance in sand/silt; poor results in  
clayey soils. Ideal subsurface conditions will  
provide effective investigative depth of up to 40  
feet.

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- ° Never exert down pressure on a probe rod so as to lift the rear tires of the vehicle off the ground.
- ° Always remove the hammer anvil or other tool from the machine before folding the machine to the horizontal position.
- ° The vehicle catalytic converter is hot and may present a fire hazard when operating over dry grass or combustibles.
- ° Geoprobe operators must wear ear protection. OSHA approved ear protection for sound levels exceeding 85 dba is recommended.
- ° The location of buried or underground utilities and services must be known before starting to drill or probe.
- ° Shut down the hydraulic system and stop the vehicle engine before attempting to clean or service the equipment.
- ° Accidental engagement of this machine may cause injury.

Local utilities should be located before inserting any rod into the ground, a task that can be expected to take a half-day to one day depending on the size of the site and its proximity to population centers. Some cities may require that special safety precautions be observed while working off roadways, such as worker signs, flashing lights, or orange pylons. The City Engineering Department generally can provide this type of information. All work should be conducted in strict accordance with the approved E & E Site Safety Plan.

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## SECTION 4: OPERATION AND FIELD PROCEDURES

### 4.1 OPERATION

The basic operating steps for the Geoprobe are detailed below. Figures 4-1 and 4-2 are schematic drawings of the hydraulic unit, and the pertinent parts are labeled on these drawings. Figure 4-3 illustrates the Geoprobe controls.

1. Position the vehicle over the sampling location. If possible, park the vehicle so that it faces downwind to avoid potential contamination of the sample from the vehicle exhaust.
2. Set the parking brake and check to affirm that the Geoprobe is on a level surface.
3. Open doors or tailgate to gain access to the hydraulic unit. Secure the doors so that wind or vibration will not cause them to slam shut.
4. Switch the electrical control to the middle position; this engages the clutch of the hydraulic system.
5. Push the extend lever down to move the derrick out from the vehicle. For best results, extend the derrick as far as possible.
6. Pull down on the fold lever to raise the derrick. The derrick must be fully extended in order to clear the roof of the vehicle.
7. Pull down the foot lever to place the probe foot on the ground surface. After the foot is resting on the ground, continue the downward motion of the foot until the rear of the vehicle has been raised approximately 6 inches.
8. Pull down on the probe lever to initiate the upward movement of the probe. Raise the probe to its maximum height, so that the appropriate sampling device can be inserted beneath it.
9. Shut off hydraulics by positioning the switch to the off position. Place the anvil in the anvil holder and secure it with the hammer latch. Turn hydraulics back on.
10. The appropriate sampling device should now be emplaced; a well point, shelly tube, or soil-gas configuration.

### 4.2 FIELD PROCEDURES

#### 4.2.1 Well Point Insertion

Screw drive cap into the male end of the well point. Insert the pipe unit into the anvil and push the probe lever down. Push the well



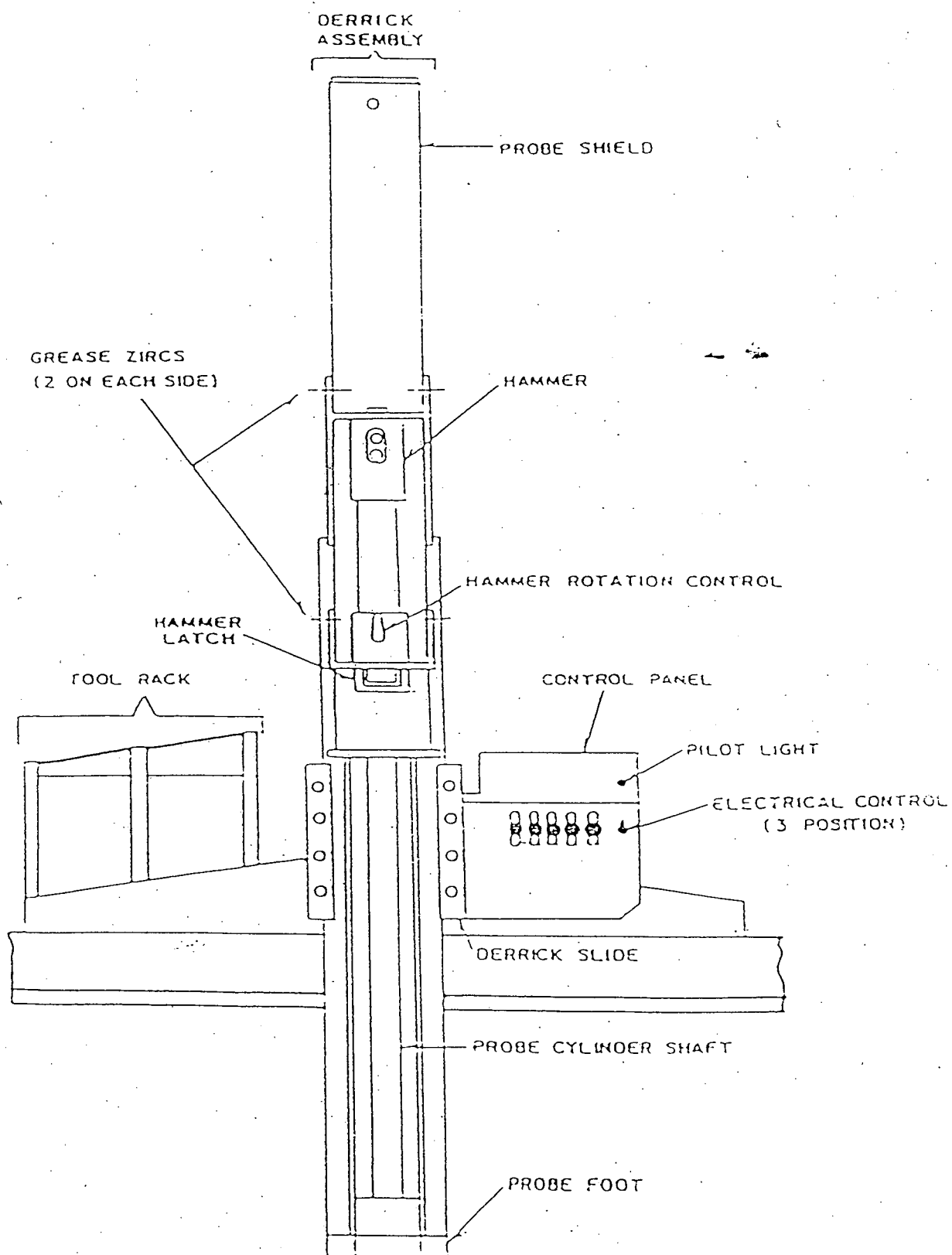


FIGURE 4-e SCHEMATIC OF HYDRAULIC UNIT (FRONT VIEW)

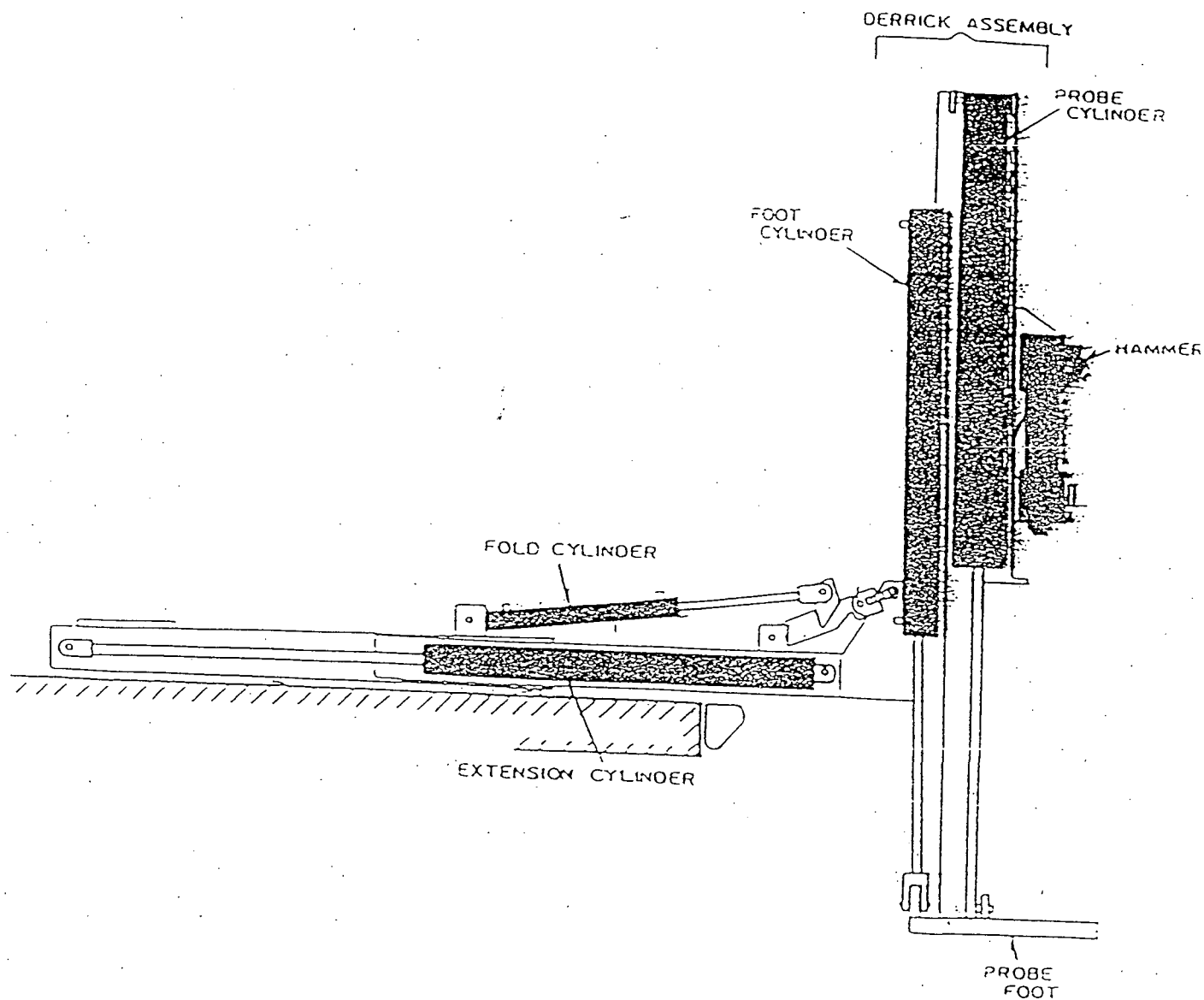


FIGURE 4-2: SCHEMATIC OF HYDRAULIC UNIT (SIDE VIEW)

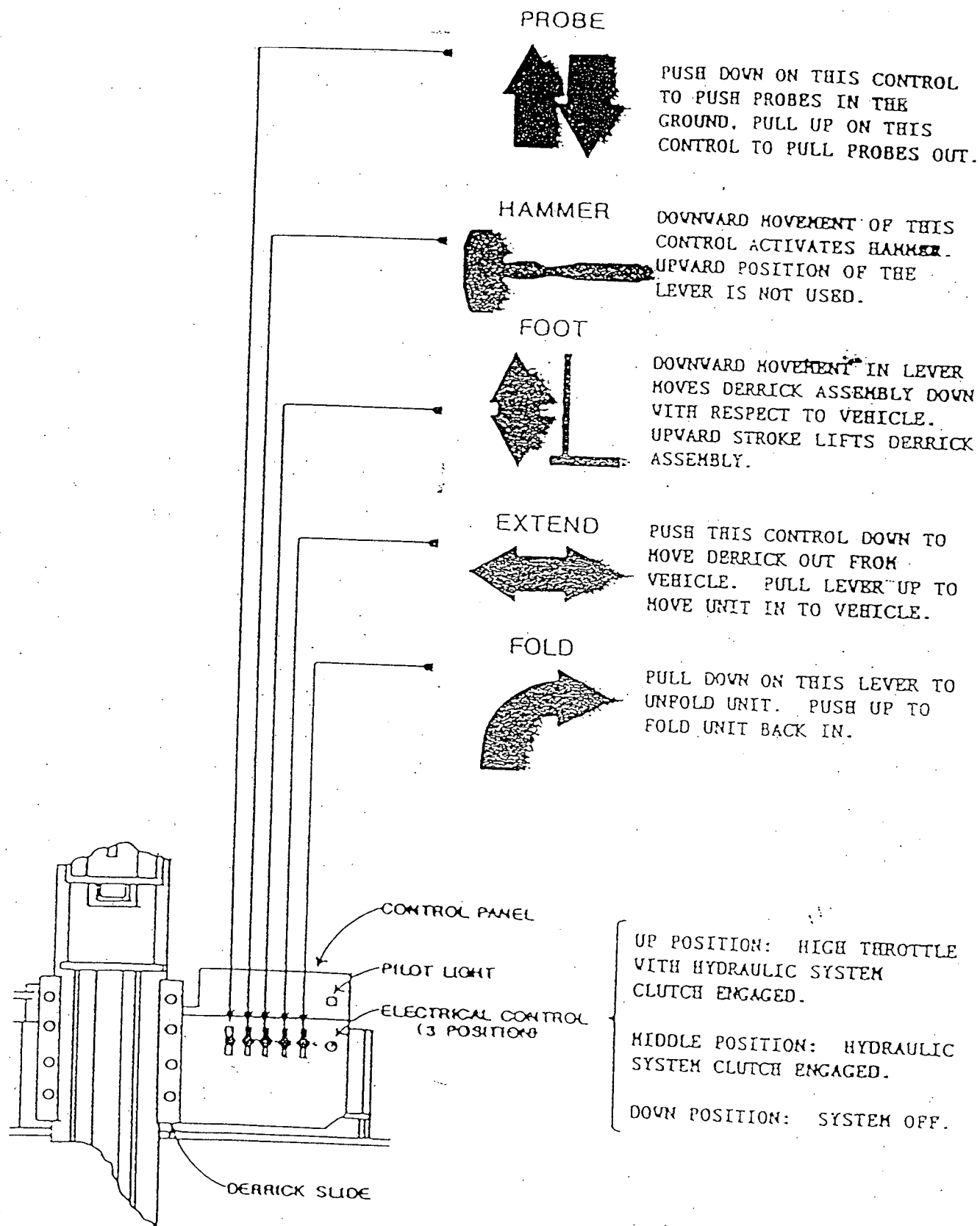


FIGURE 4-3: GEOPROBE CONTROLS

point into the ground until the derrick has reached the end of its downward stroke. Pull down on the probe lever until the derrick reaches its maximum height. Attach a 3-foot section of rod to the well point, first wrapping the pipe threads with teflon tape or an O-ring to assure a proper seal. Continue to advance rod, adding additional 3-foot sections until the sampling depth is achieved.

Attach the sample cap to the last length of Geoprobe rod, taping or affixing O-rings in the same manner as with the pipe. Determine the water level using a water level indicator with an OD of 1/2-inch or smaller. Hook up the water trap as illustrated on Figure 4-4. Turn on the vacuum pump and purge three well volumes, or a minimum of one gallon. Retrieve samples by pumping directly into a sampling bottle and then transferring the sample to the appropriate container.

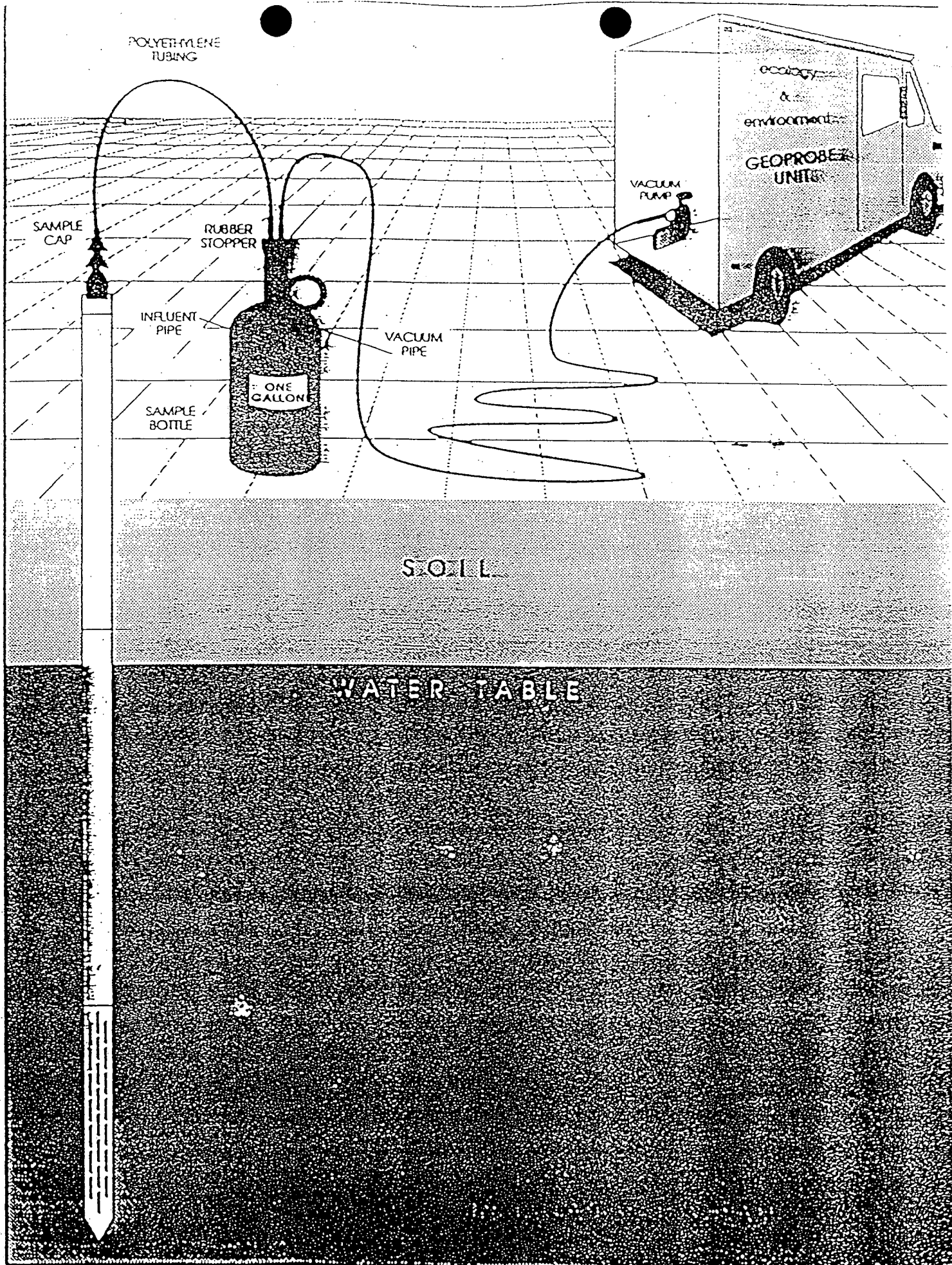
If samples are to be analyzed for volatile organic compounds (VOCs), these samples should be collected first with the mini-bailer to avoid introducing disturbed sediment into the sample.

#### 4.2.2 Shelby Tube Sampling

Subsurface soil samples are collected with 2-inch shelly tubes. This sampling technique is most effective in a silt or silt/sand that is free of gravel or pebbles, which will bend the walls of the shelly tubes. The sample is retrieved by inserting the shelly tube drive head into the shelly tube, with a drive cap connected to the male end. This configuration is pushed into the ground in the same manner as the well point. Three-foot lengths of steel rod are added to the shelly tube to the sampling depth. When the shelly tube has been advanced to depth, the system is reversed and the shelly tubes are withdrawn. The sample is contained within the shelly tube (Figure 4-3). To extract the sample, fold the derrick to a horizontal position. The shelly tube extractor is emplaced and the sample is extruded into a stainless steel or aluminum pan for sampling.

#### 4.2.3 Soil-Gas Sampling

The collection of soil-gas samples is very similar to inserting a well point. The only difference is that instead of using the well point an expendable point holder is screwed into the female end of the pipe.



An expendable point is then inserted into this holder and the pipe unit is pushed into the ground. The pushing motion is accomplished in the same fashion as inserting the well point. The probe rod is then pulled up approximately one foot to release the expendable point. By pulling the probe up a void is formed from which the vapor sample is collected. After pulling up the probe rod the sample cap is attached again with teflon tape or an "O" ring. The gas sampling collection system is then hooked up (see soil-gas SOP for the different types of collection systems). The hydraulic vacuum pump on board the vehicle is used to create the vacuum. The probe pipe is then removed from the ground leaving the expendable point down the hole.

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#### 4.2.4 Carbide-Tipped Drill Bit

This bit is for use on concrete, asphalt, or any other hard surface, such as frozen ground. To operate the drill bit, raise the derrick approximately half way so that the drill bit will fit between the ground surface and the hammer latch. To insert the drill, pull the hammer latch out and insert the drill bit where the anvil usually is placed. Push the hammer latch back in to secure the drill bit. Lower the derrick with the probe lever until the drill bit makes contact with the ground. To begin drilling, rotate the hammer rotation control to the right for drilling rotation. The left counter rotation is used when retracting the drill or for cleaning out the hole. After turning the rotation lever push down on the hammer lever, which initiates the rotation and a hammering motion. Slowly push down on the probe lever to start the drill into the ground surface. Continue this procedure, taking care not to apply too much down pressure, which may cause the drill to bind up and stop rotating.

After drilling through the hard surface, pull up on the probe lever to remove the drill from the hole. To retrieve a sample, simply put the appropriate sampling point down the hole.

#### 4.2.5 Decontamination

Decontamination procedures for the Geoprobe vary depending on the type of sampling conducted. The equipment needed for decontamination is detailed according to the various types of sampling.

## Well Points

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The well points and rods are decontaminated with a high pressure steam cleaner and alconox detergent wash to remove dirt, oil, or other substances. Follow with a tap water rinse, and a final deionized water rinse.

## Shelby Tubes

Shelby tubes are decontaminated using the same process as for the well points.

## Soil-Gas Apparatus

The parts of the soil-gas apparatus that require decontamination are the rod, point holder, and the sampling cap. These are generally heated with a propane heater to a temperature sufficient to drive off volatiles or semi-volatiles. In cases where product or soil is stuck to the parts, steam cleaning is suggested. The parts are heated to a temperature at which water will boil on their surface, then are allowed to cool. Deionized water may be sprayed on the parts to speed up the cooling process.

## 4.3 SHUT DOWN

To remove the rod from the hole, attach the pull cap to the top of the rod. Bring the derrick down by pulling down on the probe lever. When the derrick is at the top of the pull cap, latch the hammer latch onto the pull cap. Pull up on the probe lever to extract the rod, unscrewing the 3-foot rod lengths until all of the pipe is removed.

To fold the Geoprobe back into the vehicle, push down on the probe lever to bring the derrick down until the derrick stops. Pull up on the foot lever to bring the foot off of the ground a few inches. Push up on the fold lever to fold the Geoprobe into the vehicle. Pull up on the extend lever to slide the Geoprobe into the vehicle. Pull up on the foot lever to bring the foot the remainder of the way into the back of the vehicle. Shut off the hydraulics, and close the doors (or tail-gate).

Backfill the hole with bentonite granules or bentonite/sand mixture to avoid providing a conduit into the subsurface. Release emergency brake, and move vehicle to next sampling location.

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SECTION 5: BIBLIOGRAPHY

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Geoprobe Systems, Model 8-A Operations Manual, Salina, Kansas, 1989.

Ecology and Environment, Inc., Standard Operating Procedures for  
Soil-Gas Sampling, Buffalo, New York, October 1987.

**APPENDIX C**

**DECONTAMINATION PROCEDURES FOR EQUIPMENT USED IN GROUNDWATER AND SOIL INVESTIGATIONS<sup>1</sup>**

<sup>1</sup> From ADEQ Quality Assurance Project Plan, May 1991

4. Rinse several times with distilled water.
5. Reassemble filter.
6. Run distilled water followed by sample water through filter prior to collection of sample.

#### SECTION 9: SOIL SAMPLING PROCEDURES

Soil sampling is an important adjunct to groundwater monitoring. The sampling of the soil horizons above the groundwater table can help detect contaminations before they have migrated into the water table, and can help establish the amount of contamination sorbed on the aquifer solids. While considerable efforts have been made to establish protocols for sampling air and water borne pollutants, complexities encountered in sampling the soil system have been a major handicap in the development of field procedures. A wide range of environmental factors must be considered in the process of designing a soil sampling plan. Because soil types can vary considerably over a short distance, it is important that a detailed record be maintained during the sampling operation. Information recorded should include location, depth, and such soil properties as grain size, color, and odor. Subsurface conditions remain fairly stable on a daily basis, however seasonal changes can greatly affect the biochemical conditions within the soil mass, and should be taken into consideration.

The variation that seems to be inherent in the data collected during soil sampling should be accounted for in the design of the major sampling project regardless of the aim of the study. This includes the sampling design, the collection procedures, the analytical procedures, and the data analysis.

The methods outlined below are for the collection of soil samples. A brief description of more complicated sampling tools will be presented for situations where simplified methods are not applicable. Additional information about various drilling

techniques available for deep soil investigations can be found in the publications from American Society for Testing and Materials (ASTM), or National Water Well Association (NWWA).

Samples can either be collected with some form of core sampling or auger device or they may be collected by use of excavations or trenches. In the latter case the samples are cut from the soil mass with spades, scoops or punches. The American Society for Testing and Materials has developed a number of methods that have direct application to soil sampling. However, these methods might need appropriate modification since ASTM's main concerns are engineering aspects while the needs of the environmental scientist are primarily related to the chemical status of the soil. It is therefore necessary to carefully match specific analytical requirements with the sampling technique under consideration.

If soil water is desired, the samples can be collected by suction devices or other tools for soil water extraction. The statistical designs would be the same no matter which soil water collection technique is adapted. Some of these techniques will be covered in the discussion on soil water.

#### 9.1 Decontamination of Equipment

All non-dedicated devices employed in the soil sampling process (for example, split spoon sampler or soil auger), need to be decontaminated between successive, or at the end of, sampling activities. The most reliable methods are those that assure complete isolation of one sample from the next. The following is a field decontamination procedure, adapted from Mason (1983).

- o Wash and scrub with tap water using a pressure hose or pressurized stainless steel, fruit tree sprayer.
- o Check for adhered organics with a clean laboratory tissue.
- o Air dry the equipment.

- o Double rinse with deionized, distilled water.
- o Rinse twice with hexane/or acetone.
- o Air dry the equipment.
- o Package in plastic bags and/or pre-cleaned aluminum foil.

All wash and rinse water, to the extent possible, will be transferred to 2081 (55-gallon) drums, which will be sealed, labeled as to the contents, and stored on site. Rinse solvents will be transferred to open 20B-1 drums for evaporation (EPA, SHM, 19B4).

#### 9.2 Surface Sampling

In this sample collection category soil samples are taken from the upper zone of the soil profile. The depth of this zone may vary with the particular site conditions; generally it is bounded to about 50 cm in depth. Soil surface sampling is relatively easy and the least costly compared to other soil sampling methods. Nonetheless, a strict sampling procedure that obeys all components of a quality assurance plan must be implemented, particularly at this zone because of its high susceptibility to cross contamination. General logical steps that could be considered in any qualified soil sampling plan follow.

1. Carefully remove the top layer of soil to the desired sample depth.
2. Using a proper soil collection device (scoop, trowel etc.) obtain the desired quantity of soil.
3. Transfer sample into an appropriate sample bottle with a stainless steel lab spoon or equivalent.
4. Check that a Teflon liner is present in the cap if required. Secure the cap tightly. The chemical preservation of solids is generally not recommended. Refrigeration is usually the best approach supplemented by a minimal holding time.

100 ml processed should be discarded as a rinse. Even if very careful procedures are followed, clogging and small particles breakthrough are real problems which must be addressed on a case by case basis.

A generalized procedure for filtering field samples is as follows:

1. Obtain a decontaminated filtering device (see Section 8.9.5 for appropriate decontamination procedure). ADEQ has two filtering devices: 1.) Geo-Tech filter holder with an electric peristaltic pump, and 2.) Gilman-Filter holder with pump.
2. Select appropriate filter size and material. Generally a .45 um membrane filter is used.
3. Assemble filter.
4. Flush filter. Run at least 16 ounces of the sample water through the filter system and discard prior to collection of sample.
5. Collect sample, in acidified container or add preservative.

Sample Filtration for Bacterial Samples is discussed in Section 8.8.1.

## 8.9 Decontamination Procedures For Groundwater Sampling Equipment

Decontamination procedures are described for various types of equipment used during groundwater sampling efforts.

### 8.9.1 Safety Equipment

The following procedures are suitable for decontaminating safety equipment such as respirators, boots, and gloves that are susceptible to degradation by solvent rinsing.

1. Brush off loose dirt with soft bristle brush or cloth.
2. Rinse thoroughly with tap water.

3. Wash in nonphosphate detergent in warm water .
4. Rinse thoroughly with tap water.
5. Rinse thoroughly with reagent grade distilled/deionized water.
6. Air dry in dust free environment, keep articles out of the sun.
7. Store in plastic bags.

#### 8.9.2 Ancillary Equipment

The following procedures are suitable for decontaminating ancillary equipment such as ropes, extension cords, generators, hand carts, and field sampling equipment to be returned to the laboratory for decontamination.

1. Brush off loose dirt with stiff bristle brush.
2. Rinse off with high pressure water.
3. Air dry.

#### 8.9.3 Pumps

1. Submerge pumps in a nonphosphate detergent solution such as Alconox.
2. Operate pump a minimum of 10 minutes, recycle the soap solution to a wash basin through an entire length of hose when the hose must be reused.
3. Clean all exterior surfaces of both tubing and pump with bristle brush and clean cloth.
4. Submerge pump in tap water.
5. Operate pump for a minimum of 10 minutes; recycle the water to rinse basin through an entire length of hose.
6. Submerge pump in reagent grade distilled/deionized water.

7. Pump the deionized water to the rinse basin for disposal (do not recycle deionized water).
8. Repeat steps 6 and 7 two times.
9. Place pump and hose on rack to air dry.
10. Wrap pump and coiled hose in aluminum foil if feasible and then place the equipment in a plastic bag; seal bag and place a label on the bag indicating date of decontamination.

Note: References to Alconox in this report are for illustration only; they do not imply endorsement by the ADEQ.

#### 8.9.4 Bailers

1. Disassemble both top and bottom check valve assemblies.
2. Clean all component parts in nonphosphate detergent solution using a bristle brush and a bottle brush to clean inside surfaces.
3. Rinse all surfaces five times with tap water.
4. Rinse all surfaces twice with pesticide grade hexane.
5. Rinse all surfaces five times with reagent grade distilled/deionized water (or organic free water).
6. Place all components on rack and allow to air dry.
7. Wearing clean surgical gloves (powderless), reassemble bailer.
8. Wrap bailer in aluminum foil and place it in a plastic bag; seal and label the bag indicating date of decontamination.

#### 8.9.5 Geo-Tech Filters

1. Run 1 pint of distilled water through filter hose.
2. Disassemble filter apparatus.
3. Wash with nonphosphate detergent.



**APPENDIX D**

**US EPA REGION IX CLP PAPERWORK AND INSTRUCTIONS, FIELD DATA FORMS FOR  
GROUNDWATER, SOIL AND SOIL GAS INVESTIGATIONS**

CLP PAPERWORK INSTRUCTIONS  
U. S. EPA REGION 9

1.0 ORGANIC and INORGANIC TRAFFIC REPORT/CHAIN-OF-CUSTODY RECORD

1.1 CASE DOCUMENTATION

Complete these forms when collecting RAS or RAS+SAS samples.

Enter the SAS case number (for RAS+SAS analysis only) and/or RAS case number at the top right of the form. RAS case numbers have the format "xxxxx" (i.e. 18123) and SAS case numbers have the format "xxxx-Y-xx" (i.e. 6123-Y-01).

NOTE: Do not use these numbers as sample numbers. Use the RAS sample numbers provided on the printed labels. See Section 1.2 for additional instructions.

1.2 HEADER INFORMATION

1.2.1 Box 1 - PROJECT CODE/SITE INFORMATION

Enter the Project Code (i.e. \$F), Site Name, City, State, Site Spill ID. (Note: the information entered here does not go through to the laboratory's copies.)

If sampling is not under the Superfund program, enter the Account code (account to be billed), any Regional Information and the name of the program, i.e. RCRA, in the box titled "Non-Superfund program."

1.2.2 Box 2 - REGIONAL INFORMATION

Enter the Region number, the name of your sampling company, and your name and signature in the designated spaces.

1.2.3 Box 3 - TYPE OF ACTIVITY

Check the Funding Level of sampling.

Funding Level

SF - Superfund  
PRP - Potentially Responsible Party  
ST - State  
FED - Federal

Check the code which describes the task of the sampling mission.

Pre-Remedial

PA - Preliminary Assessment  
SSI - Screening Site Investigation  
LSI - Listing Site Investigation

Remedial

RIFS - Remedial Investigation Feasibility Study  
RD - Remedial Design  
O&M - Operations and Maintenance  
NPLD - National Priorities List

Removal

CLEM - Classic Emergency  
REMA - Removal Assessment  
REM - Removal  
OIL - Oil Response  
UST - Underground Storage Tank Response

1.2.4 Box 4 - SHIPPING INFORMATION

Enter the date shipped, the carrier (i.e. Federal Express) and the air bill number in the appropriate spaces.

1.2.5 Box 5 - SHIP TO

Enter the name of the laboratory contact (i.e. Sample Custodian), laboratory name and full address.

1.2.6 Box 6 - PRESERVATIVE

This box provides a list of commonly used preservatives. Enter the appropriate preservative in Column D. If you enter "5" on the Organic Traffic Report or "7" on the Inorganic Traffic Report indicating "Other", specify the preservative used at the bottom of the "Sample Documentation" area.

If you are using more than one type of preservative, you may either note the preservatives in the box specifically under the requested analyses (i.e. in the Cyanide box enter "2") or list them, separated by commas, in the same order as the

checked sample analyses. (Alternatively, the analysis may be listed on separate lines.)

#### 1.2.7 Box 7 - SAMPLE DESCRIPTION

This box provides a list of the description/matrices of the samples that are collected. Enter the appropriate description in Column A.

### 1.3 SAMPLE DOCUMENTATION

#### 1.3.1 SAMPLE NUMBERS

Carefully transcribe the RAS sample numbers from the printed labels onto the Organic or Inorganic Traffic Report/Chain-of-Custody in the column labeled "CLP Sample Numbers."

Each RAS sample is assigned a unique sample number. A RAS sample is comprised of one matrix from one station location for one analytical program going to one laboratory.

For example, if RAS water samples are collected from the same location for both volatile and pesticide analysis and are sent to the same laboratory, they are given the same sample number. However, if these samples are sent to different laboratories, they must be given different RAS sample numbers.

RAS sample numbers have the following formats: YX123 for organic and MYX123 for inorganic samples. Use RAS sample numbers for RAS+SAS analysis.

#### 1.3.2 Column A - SAMPLE DESCRIPTION

Enter the appropriate sample description code from Box 7.

Note: Item #6 "Oil" and Item #7 "Waste" are for SAS projects only. Do not ship oily samples or waste samples without making prior arrangements with the RSCC coordinator and SMO.

#### 1.3.3 Column B - CONCENTRATION

Enter "L" for low and "M" for medium concentration samples. (Prior arrangements must have been made with the RSCC coordinator, SMO and the laboratories accepting the samples before shipping medium concentration samples. At this time,

high concentration samples must be scheduled through the SAS system.)

NOTE: Medium concentration samples must be shipped in metal cans.

1.3.4 Column C - SAMPLE TYPE COMPOSITE/GRAB

Enter the type of sample you collected. A composite is a sample composed of more than one discrete sample. A grab is a discrete sample.

1.3.5 Column D - PRESERVATIVE USED

Enter the preservative used from Box 6.

1.3.6 Column E - RAS ANALYSIS

Check the analytical fractions requested for each sample, for example, VOAs, BNAs and Pesticides/PCBs are for low/medium concentration organics. Total metals and cyanide are for low/medium concentration inorganics.

NOTE: Both total and dissolved metals can be requested for each individual inorganic sample, however, they must be assigned different sample numbers. If cyanide is also requested, it is given the same sample number(s) as the total metals sample(s).

Note: ARO/TOX analyses can only be requested for high concentration samples.

1.3.7 Column F - REGIONAL SPECIFIC TRACKING NUMBERS OR TAG NUMBERS

Region 9 does not issue tracking numbers or tag numbers. Samplers may use this column for sampler specific tracking numbers or for "Special Instructions". If you choose to use this as "Special Instructions", be sure to note, at the bottom of the "Sample Documentation" area, what the special handling is. The number and type of containers could be entered here. (i.e. 3-40 mL, 6-1L)

1.3.8 Column G - STATION LOCATION NUMBER

Enter the station location in the space provided.

1.3.9 Column H - MO/DAY/YEAR/TIME OF SAMPLE COLLECTION

Record the month, day, year and time (use military time, i.e. 1600 - 4:00 pm) of sample collection.

1.3.10 Column I - SAMPLER INITIALS

Enter your initials.

1.3.11 Column J - CORRESPONDING CLP ORGANIC/INORGANIC SAMPLE NUMBER

Enter the corresponding CLP sample number for organic or inorganic analysis.

1.3.12 Column K - DESIGNATED FIELD QC

Enter the appropriate qualifier for "Blind" Field QC samples in this column. (NOTE: All samples must have a qualifier.)

<u>Blind Field QC</u>	<u>Qualifier</u>
Blind Blanks	B
Blind Field Duplicates	D
Blind Field Spikes	S
Blind PE Samples	PE
Not a QC Sample	--

Note: Information entered here is not reproduced onto the laboratories' copies.

"B" - These are blanks and include trip blanks (T), field blanks (F) and equipment blanks (E). Blanks may be further identified by the letter in parenthesis. For example, B(T) indicates that the sample is a trip blank.

"D" - These are field duplicates, but do not include samples designated as laboratory duplicates. The primary sample is identified with "---" and the duplicate is given "D" in column K. In addition, the station locations should also identify the primary and duplicate samples. For example, MW-1 is the primary sample and MW-1B is the duplicate sample.

"S" - These are spiked field samples and are generated by field personnel

"PE" - These are performance evaluation samples. They are spiked samples but are not field samples. They are usually prepared by other than field personnel.

"--" - all other samples not designated as field QC samples

1.4 "SHIPMENT FOR CASE COMPLETE (Y/N)"

This should reflect the status of the samples scheduled to be shipped to a laboratory for a specific case. Only when ALL samples scheduled/collected for shipment to a laboratory for a specific case have been shipped is the case complete.

1.5 "PAGE 1 OF \_\_\_\_"

This is usually 1. Each cooler is to be accompanied by one or more Traffic Report/Chain-of-Custody Record form(s). The form(s) accompanying each cooler must list only those samples contained in that cooler.

1.6 "SAMPLE USED FOR SPIKE AND/OR DUPLICATE"

Enter the sample number of the sample designated for spike and/or duplicate analysis. This is also known as the Laboratory QC sample. This sample should be included in the first shipment to the laboratory and in the first shipment for each subsequent sample delivery group (SDG).

1.7 "ADDITIONAL SAMPLER SIGNATURES"

Record additional sampler signatures that are different from that in Box 2.

1.8 "CHAIN OF CUSTODY SEAL NUMBER"

Enter the Chain of Custody Seal Number used to seal the cooler, if applicable.

1.9 "SPLIT SAMPLES ACCEPTED/DECLINED"

The sampler should ask the sight owner, PRP, etc. whether they want split samples taken. The split samples are either accepted or declined. Record their signature and check the appropriate box.

- 1.10 Instructions summarizing CLP sample volumes, packaging and shipment reporting requirements are printed on the back of the Traffic Reports.

2.0 SAS PACKING LIST/CHAIN-OF-CUSTODY FORM

2.1 CASE DOCUMENTATION

Complete this form when collecting SAS samples.

Enter the SAS case number at the top right of the form. SAS case numbers have the format "xxxx-Y-xx" (i.e 6123-Y-01).

NOTE: Do not use this number for sample numbers. Use the SAS sample numbers provided on the printed labels. See Section 2.2 for additional instructions.

2.2 HEADER INFORMATION

2.2.1 Box 1 - PROJECT CODE/SITE INFORMATION

Enter the Project Code (i.e \$F), Site Name, City, State, Site Spill ID. (Note: the information entered here is not reproduced onto the laboratory's copies.)

If sampling is not under the Superfund program, enter the Account code (account to be billed), any Regional Information and the name of the program, i.e. RCRA, in the box titled "Non-Superfund program."

2.2.2 Box 2 - REGIONAL INFORMATION

Enter the Region number, the name of your sampling company, and your name and signature in the designated spaces.

2.2.3 Box 3 - TYPE OF ACTIVITY

Check the Funding Level of sampling.

Funding Level

SF - Superfund  
PRP - Potential Responsible Party  
ST - State  
FED - Federal



Check the code which describes the task of the sampling mission.

Pre-Remedial

PA - Preliminary Assessment  
SSI - Screening Site Investigation  
LSI - Listing Site Investigation

Remedial

RIFS - Remedial Investigation Feasibility Study  
RD - Remedial Design  
O&M - Operations and Maintenance  
NPLD - National Priorities List

Removal

CLEM - Classic Emergency  
REMA - Removal Assessment  
REM - Removal  
OIL - Oil Response  
UST - Underground Storage Tank Response

2.2.4 Box 4 - SHIPPING INFORMATION

Enter the date shipped, the carrier (i.e. Federal Express) and the air bill number in the appropriate spaces.

2.2.5 Box 5 - SHIP TO

Enter the name of the laboratory contact (i.e. Sample Custodian), laboratory name, and full address.

2.2.6 Box 6 - SAMPLE DESCRIPTION

This box provides a list of the description/matrices of the samples that are collected. Enter the appropriate description in Column A.

2.2.7 Box 7 - PRESERVATIVE

This box provides a list of commonly used preservatives. Enter the appropriate preservative in Column C. If you enter "6" indicating "Other", specify the preservative used at the bottom of the "Sample Documentation" area.

## 2.3 SAMPLE DOCUMENTATION

### 2.3.1 SAMPLE NUMBERS

Carefully transcribe the SAS sample numbers from the printed sample labels onto the SAS/COC in the space provided.

Each SAS sample is assigned a unique sample number. A SAS sample consists on one matrix from one station location for one analysis going to one laboratory.

For example, if SAS water samples are collected from the same location for both herbicide and anion analysis and are sent to the same laboratory, they are given the same SAS sample number. However, if these samples are sent to different laboratories, they must be given different SAS sample numbers.

SAS sample numbers have the format SYxxxx (i.e. SY1234).

### 2.3.2 Column A - SAMPLE DESCRIPTION

Enter the appropriate sample description code from Box 6.

### 2.3.3 Column B - CONCENTRATION

Enter "L" for low concentration, "M" for medium concentration and "H" for high concentration.

NOTE: Medium and high concentration samples must be shipped in metal cans.

### 2.3.4 Column C - PRESERVATIVE USED

Enter the preservative used from Box 7.

If more than one type of preservative is used for a sample, separate the preservative reference numbers with commas. The sequence of the reference numbers must follow the sequence of the requested "SAS Analysis" parameters that are recorded in Column D.

### 2.3.5 Column D - ANALYSIS

Enter the analysis requested.

2.3.6 Column E - REGIONAL SPECIFIC TRACKING NUMBERS OR TAG NUMBERS

Region 9 does not issue tracking numbers or tag numbers. Samplers may use this column for sampler specific tracking numbers or for "Special Instructions". If you choose to use this as "Special Instructions", be sure to note, at the bottom of the "Sample Documentation" area, what the special handling is. The number and type of containers could be entered here (i.e. 6-1L).

2.3.7 Column F - Station Location Number

Enter the station location in the space provided.

2.3.8 Column G - Mo/Day/Year/Time of Sample Collection

Record the month, day, year and time (use military time, i.e. 1600 - 4:00 pm) of sample collection.

2.3.9 Column H - Sampler Initials

Enter your initials.

2.3.10 Column I - Designated Field QC

Enter the appropriate qualifier for "Blind" Field QC samples in this column. (NOTE: All samples must have a qualifier.)

Blind Field QC

Qualifier

Blind Blanks	B
Blind Field Duplicates	D
Blind Field Spikes	S
Blind PE Samples	PE
Not a QC Sample	--

Note: Information entered here is not reproduced onto the laboratories' copies.

"B" - These are blanks and include trip blanks (T), field blanks (F) and equipment blanks (E). Blanks may be further identified by the letter in parenthesis. For example, B(T) indicates that the sample is a trip blank.

"D" - These are field duplicates, but do not include samples designated as laboratory duplicates. The primary sample is identified with "--" and the duplicate is

give "D" in column K. In addition, the station locations should also identify the primary and duplicate samples. For example, MW-1 is the primary sample and MW-1B is the duplicate sample.

"S" - These are spiked field samples and are generated by field personnel

"PE" - These are performance evaluation samples. They are spiked samples but are not field samples. They are usually prepared by other than field personnel.

"---" - all other samples not designated as field QC samples

2.4 "SHIPMENT FOR CASE COMPLETE (Y/N)"

This should reflect the status of the samples scheduled to be shipped to a laboratory for a specific case. Only when ALL samples scheduled/collected for shipment to a laboratory for a specific case have been shipped is the case complete.

2.5 "PAGE 1 OF \_\_\_\_"

This is usually 1. Each cooler is to be accompanied by one or more Packing List/Chain-of-Custody form(s). The form(s) accompanying each cooler must list only those samples contained in that cooler.

2.6 "SAMPLE USED FOR SPIKE AND/OR DUPLICATE"

Enter the sample number of the sample designated for spike and/or duplicate analysis. This is also known as the Laboratory QC sample. This sample should be included in the first shipment to the laboratory and in the first shipment for each subsequent sample delivery group (SDG).

2.7 "ADDITIONAL SAMPLER SIGNATURES"

Record additional sampler signatures that are different from that in Box 2.

2.8 "CHAIN OF CUSTODY SEAL NUMBER"

Enter the Chain of Custody Seal Number used to seal the coolers, if applicable.

## 2.9 "SPLIT SAMPLES ACCEPTED/DECLINED"

The sampler should ask the sight owner, PRP, etc. whether they want split samples taken. The split samples are either accepted or declined. Record their signature and check the appropriate box.

- 2.10 Instructions summarizing CLP sample volumes, packaging and shipment reporting requirements are printed on the back of the Traffic Reports.

## 3.0 FIELD QA/QC SUMMARY FORM

- 3.1 Complete one form per laboratory per matrix for each sampling event. For long term projects, complete a form(s) after each month of sampling. Complete the header portion even if no QA/QC samples were provided.
- 3.2 Complete all applicable entries. Please use the appropriate sample numbers for each laboratory. (i.e. For the laboratory performing the RAS organics, use the CLP organic sample numbers, YX123, etc. For the laboratory performing the SAS analyses, use the SAS sample numbers, SY0123, etc.) Please do not use station locations. If a laboratory is performing more than one type of analyses, list all applicable sample numbers. (For example, if a laboratory is doing both RAS organics and SAS organics, list both numbers separated by a backslash, YX123/SY0123 or list the two sample number on separate lines.)
- 3.3 This form is very important for validation purposes. The validators will compare the results of duplicates and assess the quality of blanks, if they know which samples they are. The lack of this information will delay the completion of the validation.

## 4.0 SAMPLE BOTTLES

- 4.1 Sample bottles be labeled with the following information:
- a. Case or SAS number
  - b. Date/Time of collection
  - c. Matrix/Concentration
  - d. Station Location
  - e. Sample number (from the pre-printed labels)
  - f. Analysis
  - g. Preservative

- 4.2 Pre-printed, self-adhesive labels are provided for RAS Organic, RAS Inorganic and SAS samples. See Sections 1.2.1 and 2.2.1 for the proper assignment of sample numbers.

4.2.1 Transcribe the appropriate sample number onto the corresponding bottle label and/or affix the sample number label onto the bottle.

4.2.2 Destroy all unused labels or return them to the RSCC coordinator. DO NOT use them on future samplings. New sample number will be assigned.

## 5.0 DISTRIBUTION OF COPIES

### 5.1 ORGANIC TRAFFIC REPORT/CHAIN-OF-CUSTODY FORM

- a. Blue (original) copy to QAMS, Region 9
- b. Pink (second) copy to SMO
- c. White (third) and Yellow (fourth) copies accompany samples to laboratory
- d. Photocopy for sampler's files

### 5.2 INORGANIC TRAFFIC REPORT/CHAIN-OF-CUSTODY FORM

- a. Green (original) copy to QAMS, Region 9
- b. Pink (second) copy to SMO
- c. White (third) and Yellow (fourth) copies accompany samples to laboratory
- d. Photocopy for sampler's files

### 5.3 SAS PACKING LIST/CHAIN-OF-CUSTODY FORM

- a. White (original) copy to QAMS, Region 9
- b. Yellow (second) copy to SMO
- c. Pink (third) and Gold (fourth) copies accompany samples to the laboratory
- d. Photocopy for sampler's file

### 5.4 FIELD QA/QC SUMMARY FORM

- a. Original to QAMS, Region 9
- b. Photocopy for sampler's files

- 5.5 When all paperwork has been completed by the sampler and samples are ready to be shipped, place the laboratories' copies in a plastic bag and tape it to the inside of the lid of the cooler(s). SMO's copies must be submitted within 5 days of sampling. The Region's copies may be submitted at that time or at the end of the

sampling event. If the sampling event covers an extended length of time, the Region's copies must be submitted monthly. (Note: The RSCC will not forward SMO's copies. They will be returned to the sampler.)

QAMS address:

U.S. EPA Region 9  
Quality Assurance Management  
Section (P-3-2)  
75 Hawthorne Street  
San Francisco, CA 94105  
Attn: RSCC Coordinator

SMO address:

Sample Management Office  
P. O. Box 818  
Alexandria, VA 22313  
Attn: Region 9  
Coordinator

6.0 CALLING IN SHIPPING INFORMATION TO THE RSCC

- 6.1 Call the RSCC coordinator on a daily basis, even if no shipments were made, to advise on the status of the project. The Primary RSCC coordinator is Jane Anderson, (415) 882-3069. If the Primary RSCC coordinator is unavailable, call the Backup RSCC coordinator, Gail Jones at (415) 882-3067.
- 6.2 Calling in sample shipments is MANDATORY. Please provide all requested information, especially number of coolers and airbill number. This will greatly facilitate locating a lost shipment. The following information must be provided to the RSCC:
  1. Case and/or SAS number
  2. Name of Laboratory
  3. Date of shipment
  4. Carrier and airbill number
  5. Number of samples shipped by matrix and analysis type
  6. Number of coolers shipped
  7. Information on completions, changes, delays, etc.
- 6.3 Friday shipments for Saturday delivery must be called in by noon (12:00 pm) Friday. This is to enable the RSCC to pass the information on to SMO and, in turn, for SMO to contact the labs. Saturday pickup cannot be guaranteed if shipping information is received late. Samplers may not contact the labs directly. (Labs do not have to accept notification of delivery of samples from sources other than SMO.)

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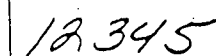
- 6.4 For Friday shipments to the Region 9 Lab, mark the boxes "HOLD FOR PICK-UP" and "DELIVERY SATURDAY". Enter the following Federal Express address in block H:

5870 S. Eastern Ave.  
Las Vegas, NV 89119  
Attn: Sample Custodian  
(702) 798-3245

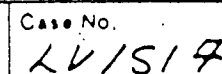
- 6.5 Try to stick to the sampling schedule. If this is not possible, let the RSCC coordinator know immediately so other arrangements can be made.
- 6.6 Send in SMO's copies of the CLP paperwork within 5 days of sampling.
- 6.7 Advise the RSCC coordinator when sample shipping is complete. Send in the Region's copies of the paperwork as soon as possible. (The RSCC will not forward SMO's copies. They will be returned to the sampling agency.) Remember to include the Field QA/QC Summary form(s) to avoid any delay in the validation process.
- 6.8 If you have an emergency and need to get information to a laboratory, your calls should be directed, in order of succession, to:

ESAT RSCC Coordinator - (415) 882-3069  
EPA RSCC Task Monitor - (415) 744-1499  
SMO Region 9 Coordinator (SAS) - (703) 519-1397  
SMO Region 9 Coordinator (RAS) - (703) 519-1471





Split Samples ☐ Accepted (Signature)  
☐ Declined





United States Environmental Protection Agency  
Contract Laboratory Program Sample Management Office  
PO Box 818 Alexandria, VA 22313  
703-557-2490 FTS 557-2490

# Inorganic Traffic Report & Chain of Custody Record

(For Inorganic CLP Analysis)

SAS No.  
(if applicable)

Case No.

12345

1. Project Code	Account Code	2. Region No. 9	Sampling Co. ACE	4. Date Shipped 9/2/91	Carrier Fed Ex	6. Preservative (Enter in Column D) 1. HCl 2. HNO3 3. NaOH 4. H2SO4 5. K2CR2O7 6. Ice only 7. Other (SAS) (Specify) N. Not preserved	7. Sample Description (Enter in Column A) 1. Surface Water 2. Ground Water 3. Leachate 4. Rinsate 5. Soil/Sediment 6. Oil (SAS) 7. Waste (SAS) 8. Other (SAS) (Specify)				
Regional Information		Sampler (Name) John Doe		Airbill Number 2345678901							
Non-Superfund Program		Sampler Signature John Doe		5. Ship To Alpha Lab 123 Pine Ave NY, NY, 10001 Attn: Lois Lane							
Site Name Hazardous Dump		4. Type of Activity Remedial SF <input checked="" type="checkbox"/> Lead PRP <input type="checkbox"/> PA ST <input type="checkbox"/> SSI FED <input type="checkbox"/> LSI		Removal RIFS <input checked="" type="checkbox"/> CLEM RO <input type="checkbox"/> REMA RA <input type="checkbox"/> REM O&M <input type="checkbox"/> OIL NPLD <input type="checkbox"/> UST							
City, State Smallville CA		Site Spill ID 99									
CLP Sample Numbers (from labels)	A Enter # from Box 7	B Conc. Low Med High	C Sample Type: Comp./Grab	D Preservative from Box 6	E - RAS Analysis Metals Total Arsenic Cyanide Nitrate Nitrite Fluoride Low Conc. High Conc. pH Conductivity	F Regional Specific Tracking Number or Tag Numbers	G Station Location Number	H Mo/Day/Year/Time Sample Collection	I Sampler Initials	J Corresp. CLP Org. Samp. No.	K Designated Field QC
MYG001	2	L	G	2	X X			MW-1	9/1/91 0900	99	YS126
MYG002	2	L	G	2	X			MW-1	9/1/91 1000	99	YS126
MYG003	2	L	G	2	X Y			Lab QC	9/1/91 1100	99	YS127
MYG004	2	L	G	2	X			Lab QC	9/1/91 1200	99	YS127
Shipment for Case complete? (Y/N)											
Page 1 of		Sample used for a spike and/or duplicate MYG003 & MYG004		Additional Sampler Signatures		Chain of Custody Seal Number					

## CHAIN OF CUSTODY RECORD

Relinquished by: (Signature) John Doe	Date / Time 9/2/91 1600	Received by: (Signature) 2345678901	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Received by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Remarks	Is custody seal intact? Y/N/none



United States Environmental Protection Agency  
Contract Laboratory Program: Sample Management Office  
PO Box 818 Alexandria, VA 22313  
703-557-2490 FTS 557-2490

# Special Analytical Service

Packing List/Chain of Custody

SAS No.

6123-Y

1. Project Code		Account Code		2. Region No. Sampling Co.		4. Date Shipped Carrier		6. Sample Description (Enter in Column A)		7. Preservative (Enter in Column C)	
				9 ACE		9/1/91 Fed Ex					
Regional Information				Sampler (Name)				Airbill Number			
				Gail Jones				4567891011			
Non-Superfund Program				Sampler Signature				5. Ship To			
				Gail Jones				Beta Lab			
Site Name				3. Type of Action				101 main St			
Hazardous Dump				SF <input checked="" type="checkbox"/> RIFS <input checked="" type="checkbox"/> CLEM <input type="checkbox"/>				NY, NY			
City, State				PRP <input type="checkbox"/> PA <input type="checkbox"/> RA <input type="checkbox"/> REM <input type="checkbox"/>				Attn: Clark Kent			
Smallville CA				ST <input type="checkbox"/> SS <input type="checkbox"/> O&M <input type="checkbox"/> OIL <input type="checkbox"/>							
Site Spill ID				FED <input type="checkbox"/> LSI <input type="checkbox"/> NPLD <input type="checkbox"/> UST <input type="checkbox"/>							
Sample Numbers		A Matrix Enter from Box 6	B Conc Low Med High	C Preservative Used from Box 7	D Analysis	E Sample used for spike and/or duplicate	F Regional Specific Tracking Number or Tag Number	G Station Location Identifier	H Mo/Day/Year/Time Sample Collection	I Sampler Initials	J Designated Field QC
1 SY0001		2	L	7	A			MW-1	9/1/91 1030	gt	
2 SY0002		2	L	7	A	Lab OC		MW-2	9/1/91 1100	gt	
3 SY0003		2	L	7	B			MW-3	9/1/91 1130	gt	
4 SY0004		2	L	7	A			MW-4	9/1/91 1200	gt	B
5											
6											
7											
8											
9											
10											
A = Herbicides and Carbamates B = Herbicides only											
Shipment for SAS complete? (Y/N) <input checked="" type="checkbox"/>											

## CHAIN OF CUSTODY RECORD

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Gail Jones	9/1/91 1500	4567891011			
Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Received by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Remarks	Is custody seal intact? Y/N/none
EPA Form			Split Samples <input type="checkbox"/> Accepted (Signature) <input type="checkbox"/> Declined		
DISTRIBUTION:					
White - Region Copy Yellow - SMO Copy Gold - Lab Copy Pink - Lab Copy for Release					

FIELD QA/QC SUMMARY FORM

Instructions: Complete one form per laboratory and per matrix for each sampling event.

Date: 9/18/91 Site: Haz. Dump  
 Sampler: John Doe Case/SAS #: 12345  
 Office: ACE Laboratory: Alpha  
 Phone 1: (423) 456-7890  
 Matrix: ☒ Groundwater ☐ Surface Soil ☐ Air  
 (check one) ☐ Surface Water ☐ Subsurface Soil ☐ Other \_\_\_\_\_

**I. BLANKS**

Sample #	Type (circle one)	Date Collected
<u>MYG020</u>	<u>Equip</u> Field / Travel	<u>9/11/91</u>
_____	Equip / Field / Travel	_____
_____	Equip / Field / Travel	_____
_____	Equip / Field / Travel	_____
_____	Equip / Field / Travel	_____
_____	Equip / Field / Travel	_____
_____	Equip / Field / Travel	_____
_____	Equip / Field / Travel	_____
_____	Equip / Field / Travel	_____
_____	Equip / Field / Travel	_____
_____	Equip / Field / Travel	_____

**II. BACKGROUND SAMPLES**

Sample #	Date Collected
<u>none</u>	_____
_____	_____
_____	_____
_____	_____

**III. LAB QC SAMPLES**

Sample #	Date Collected
<u>MYG009</u>	<u>9/8/91</u>
_____	_____
_____	_____
_____	_____

**IV. DUPLICATES**

Sample #	Matches Sample #	Date Collected	Type (circle one)	
<u>MYG002</u>	<u>MYG003</u>	<u>9/2/91</u>	<u>a</u> / b / c / d	a = composite split
_____	_____	_____	a / b / c / d	b = consecutive
_____	_____	_____	a / b / c / d	c = colocated
_____	_____	_____	a / b / c / d	d = consecutive
_____	_____	_____	a / b / c / d	soil sleeves
_____	_____	_____	a / b / c / d	

**V. Checklist of Field Problems Encountered**

<input checked="" type="checkbox"/> None	Sample # / Date(s) of Occurrence / Comments
<input type="checkbox"/> Pumping Equipment Problems	_____
<input type="checkbox"/> Sample Filtering Problems	_____
<input type="checkbox"/> Less Than Required Sample Volume	_____
<input type="checkbox"/> Low Flow/Recharge Rates	_____
<input type="checkbox"/> Preservation Problem	_____
<input type="checkbox"/> Samples Not Shipped In 24hrs.	_____
<input type="checkbox"/> Federal Express Delay	_____
<input type="checkbox"/> Other	_____

Date: \_\_\_\_\_

### Calibration

Gas:

Concentration: \_\_\_\_\_

**Instrument Reading:** \_\_\_\_\_

**Span Setting:** \_\_\_\_\_

[illegible]

Arizona Department of Environmental Quality  
Site Assessment Hydrology Unit

Site: \_\_\_\_\_

Date: \_\_\_\_\_

Personnel: \_\_\_\_\_

Weather: \_\_\_\_\_

[illegible]

Date: \_\_\_\_\_

Weather: \_\_\_\_\_

:-brrr



Arizona Department of Environmental Quality  
Site Assessment Hydrology Unit  
Soil Gas Data Sheet

Site: \_\_\_\_\_

Date: \_\_\_\_\_ Personnel: \_\_\_\_\_

SAMPLE ID: \_\_\_\_\_ Depth: \_\_\_\_\_

Location: \_\_\_\_\_

Vacuum (in. Hg) \_\_\_\_\_ Flow Rate (1/min) \_\_\_\_\_ System Vol. \_\_\_\_\_

Purge Time: Start \_\_\_\_\_ End \_\_\_\_\_ (Min.) Purge Vol \_\_\_\_\_

Sample Time: Start \_\_\_\_\_ End \_\_\_\_\_ (Min.)

Sample Volume: \_\_\_\_\_

REMARKS: \_\_\_\_\_

SAMPLE ID: \_\_\_\_\_ Depth: \_\_\_\_\_

Location: \_\_\_\_\_

Vacuum (in. Hg) \_\_\_\_\_ Flow Rate (1/min) \_\_\_\_\_ System Vol. \_\_\_\_\_

Purge Time: Start \_\_\_\_\_ End \_\_\_\_\_ (Min.) Purge Vol \_\_\_\_\_

Sample Time: Start \_\_\_\_\_ End \_\_\_\_\_ (Min.)

Sample Volume: \_\_\_\_\_

REMARKS: \_\_\_\_\_

SAMPLE ID: \_\_\_\_\_ Depth: \_\_\_\_\_

Location: \_\_\_\_\_

Vacuum (in. Hg) \_\_\_\_\_ Flow Rate (1/min) \_\_\_\_\_ System Vol. \_\_\_\_\_

Purge Time: Start \_\_\_\_\_ End \_\_\_\_\_ (Min.) Purge Vol \_\_\_\_\_

Sample Time: Start \_\_\_\_\_ End \_\_\_\_\_ (Min.)




Sample Volume: \_\_\_\_\_




REMARKS: \_\_\_\_\_

**APPENDIX E**

**CONTAINER REQUIREMENTS AND HOLD TIMES PER ANALYTICAL PARAMETER**

# ORGANIC SAMPLE COLLECTION REQUIREMENTS





WATER SAMPLES	REQUIRED VOLUME		CONTAINER TYPE
EXTRACTABLE ANALYSIS (LOW LEVEL)	1 GALLON		4 x 1-LITER AMBER GLASS BOTTLES
EXTRACTABLE ANALYSIS (MEDIUM LEVEL*)	1 GALLON		4 x 32-OZ. WIDE-MOUTH GLASS JARS
VOLATILE ANALYSIS (LOW OR MEDIUM LEVEL*)	80 ML		2 x 40-ML GLASS VIALS



SOIL/SEDIMENT SAMPLES	REQUIRED VOLUME		CONTAINER TYPE
EXTRACTABLE ANALYSIS (LOW OR MEDIUM LEVEL*)	6 OZ.		1 x 8-OZ. WIDE-MOUTH GLASS JAR
		OR	
			2 x 4-OZ. WIDE-MOUTH GLASS JARS
VOLATILE ANALYSIS (LOW OR MEDIUM LEVEL*)	240 ML		2 x 120-ML WIDE-MOUTH GLASS VIALS

\*ALL MEDIUM LEVEL SAMPLES TO BE SEALED IN METAL PAINT CAN FOR SHIPMENT



# INORGANIC SAMPLE COLLECTION REQUIREMENTS


WATER SAMPLES	REQUIRED VOLUME		CONTAINER TYPE
METALS ANALYSIS (LOW LEVEL)	1 LITER		1 x 1-LITER POLYETHYLENE BOTTLE
METALS ANALYSIS (MEDIUM LEVEL*)	16 OZ.		1 x 16-OZ. WIDE-MOUTH GLASS JAR
CYANIDE (CN <sup>-</sup> ) ANALYSIS (LOW LEVEL)	1 LITER		1 x 1-LITER POLYETHYLENE BOTTLE
CYANIDE (CN <sup>-</sup> ) ANALYSIS (MEDIUM LEVEL*)	16 OZ.		1 x 16-OZ. WIDE-MOUTH GLASS JAR



SOIL/SEDIMENT SAMPLES	REQUIRED VOLUME		CONTAINER TYPE
METALS AND CYANIDE (CN <sup>-</sup> ) ANALYSIS (LOW OR MEDIUM LEVEL*)	6 OZ.		1 x 8-OZ. WIDE-MOUTH GLASS JAR
			OR
			2 x 4-OZ. WIDE-MOUTH GLASS JARS

\*ALL MEDIUM LEVEL SAMPLES TO BE SEALED IN METAL PAINT CAN FOR SHIPMENT




# DIOXIN SAMPLE COLLECTION REQUIREMENTS

WATER SAMPLES	REQUIRED VOLUME		CONTAINER TYPE
2,3,7,8-TCDD ANALYSIS (MULTI-CONCENTRATION)	2 LITERS		2 x 1-LITER AMBER GLASS BOTTLES

SOIL/SEDIMENT SAMPLES	REQUIRED VOLUME		CONTAINER TYPE
2,3,7,8-TCDD ANALYSIS (MULTI-CONCENTRATION)	4 OZ.		1 x 4-OZ. WIDE-MOUTH GLASS JAR
			OR 1 x 8-OZ. WIDE-MOUTH GLASS JAR

# HIGH HAZARD SAMPLE COLLECTION REQUIREMENTS

LIQUID OR SOLID SAMPLES	REQUIRED VOLUME		CONTAINER TYPE
ORGANIC AND INORGANIC ANALYSIS	6 OZ.		1 x 8-OZ. WIDE-MOUTH GLASS JAR

\*ALL MEDIUM LEVEL SAMPLES TO BE SEALED IN METAL PAINT CAN FOR SHIPMENT



(11/92)

Preservation Requirements for RAS Analyses

WATER SAMPLES

<u>Parameter</u>	<u>Concentration</u>	<u>Preservation</u>
Volatiles	Low/Medium	<p>Acidify to pH &lt; 2 with HCl. Add 2 drops 1:1 HCl per vial before sample collection. This is generally sufficient to obtain pH &lt; 2, but depends upon the buffering capability of each aquifer and upon the particular eyedropper used. During purging, conduct a pH test on at least one vial at each site for each aquifer. The tested vial must be discarded. If the pH is &gt; 2, additional HCl should be added to sample vials. Another vial should be pH tested to ensure pH is now &lt; 2. Discard the test vial.</p> <p>If the sample is suspected of containing residual chlorine or is to be analyzed for disinfection by-products such as trihalomethanes, other preservation techniques employing reducing agents such as ascorbic acid may be required.</p> <p>Chill collected samples to 4° C. Samples must be filled with zero headspace and checked for air bubbles by inverting and rapping sharply against palm. If a pea-size or larger bubble appears, another sample must be collected. If acidification causes bubbling, collect non-acidified samples and notify the RSCC.</p>
Semivolatiles	Low/Medium	Chill to 4° C
Pesticides/PCBs	Low/Medium	Chill to 4° C
Dissolved Metals	Low/Medium	Filter Sample through 0.45 micron filter immediately after sample collection or with in-line filtration when possible. Acidify to pH ≤ 2 with HNO <sub>3</sub> after filtration.
Total Metals	Low/Medium	Includes suspended sediments and particulates. Acidify to pH < 2 with HNO <sub>3</sub> .

Preservation Requirements for RAS Analyses

## WATER SAMPLES

<u>Parameter</u>	<u>Concentration</u>	<u>Preservation</u>
Cyanides	Low/Medium	<p>Preserve all samples with 2 ml of 10 N NaOH per liter of sample to pH &gt; 12. Chill to 4° C.</p> <p>Treatment for chlorine or other known oxidizing agents may be necessary. Test a drop of the sample with potassium iodide-starch test paper (K-I starch test paper). A blue color indicates the need for treatment. Add ascorbic acid, a few crystals at a time, until a drop of sample produces no color on the indicator paper. Then add an additional 0.6 g of ascorbic acid for each liter of sample volume.</p>

Preservation Requirements for RAS Analyses

## SOIL SAMPLES

<u>Parameter</u>	<u>Concentration</u>	<u>Preservation</u>
Organics	Low/Medium	Chill to 4° C
Metals	Low/Medium	None
Cyanide	Low/Medium	Chill to 4° C

(11/92)

Analytical and Contractual Holding Times for RAS Analyses

Matrix:	Water		Soil	
	Analytical *	Contractual**	Analytical*	Contractual**
<u>Analysis</u>	<u>Holding Times</u>	<u>Holding Times</u>	<u>Holding Times</u>	<u>Holding Times</u>
VOA	14 days	10 days	14 days	10 days
B/N/A	7 days	5 days	14 days	10 days
Pest./PCB	7 days	5 days	14 days	10 days
Mercury	28 days	26 days	28 days	26 days
Cyanide	14 days	12 days	14 days	12 days
Metals	6 months	35 days	6 months	35 days

\* The Analytical Holding Time is the amount of time a sample or extract may be held from sample collection to sample extraction and analysis without the results being qualified due to potential chemical degradation, analyte losses, or other changes.

\*\* The Contractual Holding Time is the amount of time a sample or extract may be held from sample receipt at the laboratory to sample extraction and analysis according to the contract with the laboratory. Contractual Holding Times are generally a few days shorter than Analytical Holding Times to allow for sample shipment to the laboratory.



## **APPENDIX F**

### **SAMPLE TREATMENT AND PRESERVATION FOR RASA AND SAS PARAMETERS**

## SAMPLE PRESERVATION

Complete and unequivocal preservation of samples, either domestic sewage, industrial wastes, or natural waters, is a practical impossibility. Regardless of the nature of the sample, complete stability for every constituent can never be achieved. At best, preservation techniques can only retard the chemical and biological changes that inevitably continue after the sample is removed from the parent source. The changes that take place in a sample are either chemical or biological. In the former case, certain changes occur in the chemical structure of the constituents that are a function of physical conditions. Metal cations may precipitate as hydroxides or form complexes with other constituents; cations or anions may change valence states under certain reducing or oxidizing conditions; other constituents may dissolve or volatilize with the passage of time. Metal cations may also adsorb onto surfaces (glass, plastic, quartz, etc.), such as, iron and lead. Biological changes taking place in a sample may change the valence of an element or a radical to a different valence. Soluble constituents may be converted to organically bound materials in cell structures, or cell lysis may result in release of cellular material into solution. The well known nitrogen and phosphorus cycles are examples of biological influence on sample composition. Therefore, as a general rule, it is best to analyze the samples as soon as possible after collection. This is especially true when the analyte concentration is expected to be in the low  $\mu\text{g/l}$  range.

Methods of preservation are relatively limited and are intended generally to (1) retard biological action, (2) retard hydrolysis of chemical compounds and complexes, (3) reduce volatility of constituents, and (4) reduce absorption effects. Preservation methods are generally limited to pH control, chemical addition, refrigeration, and freezing.

The recommended preservative for various constituents is given in Table 1. These choices are based on the accompanying references and on information supplied by various Quality Assurance Coordinators. As more data become available, these recommended holding times will be adjusted to reflect new information. Other information provided in the table is an estimation of the volume of sample required for the analysis, the suggested type of container, and the maximum recommended holding times for samples properly preserved.

TABLE 1

RECOMMENDATION FOR SAMPLING AND PRESERVATION  
OF SAMPLES ACCORDING TO MEASUREMENT<sup>(1)</sup>

<u>Measurement</u>	<u>Vol. Req. (ml)</u>	<u>Container</u> <sup>2</sup>	<u>Preservative</u> <sup>3,4</sup>	<u>Holding Time</u> <sup>5</sup>
100 <u>Physical Properties</u>				
Color	50	P,G	Cool, 4°C	48 Hrs.
Conductance	100	P,G	Cool, 4°C	28 Days
Hardness	100	P,G	HNO <sub>3</sub> to pH < 2	6 Mos.
Odor	200	G only	Cool, 4°C	24 Hrs.
pH	25	P,G	None Req.	Analyze Immediately
Residue				
Filterable	100	P,G	Cool, 4°C	7 Days
Non- Filterable	100	P,G	Cool, 4°C	7 Days
Total	100	P,G	Cool, 4°C	7 Days
Volatile	100	P,G	Cool, 4°C	7 Days
Settleable Matter	1000	P,G	Cool, 4°C	48 Hrs.
Temperature	1000	P,G	None Req.	Analyze Immediately
Turbidity	100	P,G	Cool, 4°C	48 Hrs.
200 <u>Metals</u>				
Dissolved	200	P,G	Filter on site HNO <sub>3</sub> to pH < 2	6 Mos.
Suspended	200		Filter on site	6 Mos.
Total	100	P,G	HNO <sub>3</sub> to pH < 2	6 Mos.

TABLE 1 (CONT)

<u>Measurement</u>	<u>Vol. Req. (ml)</u>	<u>Container</u> <sup>2</sup>	<u>Preservative</u> <sup>3,4</sup>	<u>Holding Time</u> <sup>5</sup>
Dissolved Oxygen Probe	300	G bottle and top	None Req.	Analyze Immediately
Winkler	300	G bottle and top	Fix on site and store in dark	8 Hours
Phosphorus Ortho- phosphate, Dissolved	50	P,G	Filter on site Cool, 4°C	48 Hrs.
Hydrolyzable	50	P,G	Cool, 4°C H <sub>2</sub> SO <sub>4</sub> to pH < 2	28 Days
Total	50	P,G	Cool, 4°C H <sub>2</sub> SO <sub>4</sub> to pH < 2	28 Days
Total, Dissolved	50	P,G	Filter on site Cool, 4°C H <sub>2</sub> SO <sub>4</sub> to pH < 2	24 Hrs.
Silica	50	P only	Cool, 4°C	28 Days
Sulfate	50	P,G	Cool, 4°C	28 Days
Sulfide	500	P,G	Cool, 4°C add 2 ml zinc acetate plus NaOH to pH > 9	7 Days
Sulfite	50	P,G	None Req.	Analyze Immediately
400 <u>Organics</u>				
BOD	1000	P,G	Cool, 4°C	48 Hrs.
COD	50	P,G	Cool, 4°C H <sub>2</sub> SO <sub>4</sub> to pH < 2	28 Days
Oil & Grease	1000	G only	Cool, 4°C H <sub>2</sub> SO <sub>4</sub> to pH < 2	28 Days
Organic carbon	25	P,G	Cool, 4°C H <sub>2</sub> SO <sub>4</sub> or HCl to pH < 2	28 Days
Phenolics	500	G only	Cool, 4°C H <sub>2</sub> SO <sub>4</sub> to pH < 2	28 Days

TABLE 1 (CONT)

<u>Measurement</u>	<u>Vol. Req. (ml)</u>	<u>Container<sup>2</sup></u>	<u>Preservative<sup>3,4</sup></u>	<u>Holding Time<sup>5</sup></u>
Chromium <sup>4</sup>	200	P,G	Cool, 4°C	24 Hrs.
Mercury Dissolved	100	P,G	Filter HNO <sub>3</sub> to pH < 2	28 Days
Total	100	P,G	— HNO <sub>3</sub> to pH < 2 —	28 Days
300 <u>Inorganics, Non-Metallics</u>				
Acidity	100	P,G	Cool, 4°C	14 Days
Alkalinity	100	P,G	Cool, 4°C	14 Days
Bromide	100	P,G	None Req.	28 Days
Chloride	50	P,G	None Req.	28 Days
Chlorine	200	P,G	None Req.	Analyze Immediately
Cyanides	500	P,G	Cool, 4°C NaOH to pH > 12 0.6g ascorbic acid <sup>6</sup>	14 Days <sup>7</sup>
Fluoride	300	P,G	None Req.	28 Days
Iodide	100	P,G	Cool, 4°C	24 Hrs.
Nitrogen				
Ammonia	400	P,G	Cool, 4°C H <sub>2</sub> SO <sub>4</sub> to pH < 2	28 Days
Kjeldahl, Total	500	P,G	Cool, 4°C H <sub>2</sub> SO <sub>4</sub> to pH < 2	28 Days
Nitrate plus Nitrite	100	P,G	Cool, 4°C H <sub>2</sub> SO <sub>4</sub> to pH < 2	28 Days
Nitrate <sup>8</sup>	100	P,G	Cool, 4°C	48 Hrs.
Nitrite	50	P,G	Cool, 4°C	48 Hrs.

TABLE 1 (CONT)

<u>Measurement</u>	<u>Vol. Req. (ml)</u>	<u>Container</u> <sup>2</sup>	<u>Preservative</u> <sup>3,4</sup>	<u>Holding Time</u> <sup>5</sup>
MBAS	250	P,G	Cool, 4°C	48 Hrs.
NTA	50	P,G	Cool, 4°C	24 Hrs.

1. More specific instructions for preservation and sampling are found with each procedure as detailed in this manual. A general discussion on sampling water and industrial wastewater may be found in ASTM, Part 31, p. 72-82 (1976) Method D-3370.
2. Plastic (P) or Glass (G). For metals, polyethylene with a polypropylene cap (no liner) is preferred.
3. Sample preservation should be performed immediately upon sample collection. For composite samples each aliquot should be preserved at the time of collection. When use of an automated sampler makes it impossible to preserve each aliquot, then samples may be preserved by maintaining at 4°C until compositing and sample splitting is completed.
4. When any sample is to be shipped by common carrier or sent through the United States Mails, it must comply with the Department of Transportation Hazardous Materials Regulations (49 CFR Part 172). The person offering such material for transportation is responsible for ensuring such compliance. For the preservation requirements of Table 1, the Office of Hazardous Materials, Materials Transportation Bureau, Department of Transportation has determined that the Hazardous Materials Regulations do not apply to the following materials: Hydrochloric acid (HCl) in water solutions at concentrations of 0.04% by weight or less (pH about 1.96 or greater); Nitric acid (HNO<sub>3</sub>) in water solutions at concentrations of 0.15% by weight or less (pH about 1.62 or greater); Sulfuric acid (H<sub>2</sub>SO<sub>4</sub>) in water solutions at concentrations of 0.35% by weight or less (pH about 1.15 or greater); Sodium hydroxide (NaOH) in water solutions at concentrations of 0.080% by weight or less (pH about 12.30 or less).
5. Samples should be analyzed as soon as possible after collection. The times listed are the maximum times that samples may be held before analysis and still considered valid. Samples may be held for longer periods only if the permittee, or monitoring laboratory, has data on file to show that the specific types of sample under study are stable for the longer time, and has received a variance from the Regional Administrator. Some samples may not be stable for the maximum time period given in the table. A permittee, or monitoring laboratory, is obligated to hold the sample for a shorter time if knowledge exists to show this is necessary to maintain sample stability.
6. Should only be used in the presence of residual chlorine.

7. Maximum holding time is 24 hours when sulfide is present. Optionally, all samples may be tested with lead acetate paper before the pH adjustment in order to determine if sulfide is present. If sulfide is present, it can be removed by the addition of cadmium nitrate powder until a negative spot test is obtained. The sample is filtered and then NaOH is added to pH 12.
8. Samples should be filtered immediately on-site before adding preservative for dissolved metals.
9. For samples from non-chlorinated drinking water supplies conc.  $\text{H}_2\text{SO}_4$  should be added to lower sample pH to less than 2. The sample should be analyzed before 14 days.

U.S. ENVIRONMENTAL PROTECTION AGENCY REGION 9  
TOXICS & WASTE MANAGEMENT DIVISION  
FIELD OPERATIONS BRANCH

Sample Plan Title: Pacific Fruit Express Groundwater & Soil Sampling  
Site Name: Pacific Fruit Express  
Site Location: 2501 East Fairlane Stravenue  
City/State/Zip: Tucson, AZ 85713  
Site EPA ID #: AZD045804325  
Anticipated Sampling Dates: September 8 & 9, 1988  
Prepared By: Judith A. Heywood or Dan Williams 8/19/88  
Agency or Firm: Arizona Department of Environmental Quality  
Address: 2005 North Central Avenue  
City/State/Zip: Phoenix, AZ 85004  
Telephone: (602) 257-2124  
EPA Project Manager: Doug Frazer, Section (T-4-7) (415) 974-8200  
QAPjP Approval Date: \_\_\_\_\_  
Phone #

\* \* \* \* \*  
Received by Superfund Remedial Project Manager \_\_\_\_\_  
Date \_\_\_\_\_  
F O R  
Reviewed by: \_\_\_\_\_  
APPROVED / NOT APPROVED  
Date \_\_\_\_\_  
E P A  
Expedited Review? \_\_\_\_\_  
Yes/No \_\_\_\_\_  
Received by Quality Assurance Management Section: 9/12/88  
Date \_\_\_\_\_  
Reviewed by: Tom Quethman  
APPROVED / NOT APPROVED  
Date 9/13/88  
U S E  
Concurrence: David W. Ruppel for KWH  
Date 9/29/88  
Chief, Quality Assurance  
Management Section  
Environmental Services Branch, OPM

\* \* \* \* \*



PACIFIC FRUIT EXPRESS CO.  
GROUNDWATER AND SOIL SAMPLING

Submitted To

U.S. Environmental Protection Agency  
Region 9

In Accordance With The Requirements Of The EPA PA/SI Grant To  
The Arizona Department Of Environmental Quality

Judith A. Heywood, Hydrologist  
Arizona Department Of Environmental Quality

August 1988

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- I. Objective of Sampling Effort
- II. Background
- III. Maps
- IV. Rationale for Analytical Parameters, Number of Samples, and Sample Locations.
- V. Request For Analysis
- VI. Methods and Procedures
- VII. Site Safety Plan

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# I OBJECTIVE OF SAMPLING EFFORT

The main objectives of the sampling effort are:

- 1) Determine if the Pacific Fruit Express Co. (PFE) has had a release of contaminants into the groundwater or soil.
- 2) Evaluate the potential for groundwater contamination from the PFE surface impoundment.
- 3) Obtain data needed to HRS score the PFE site for inclusion on the National Priorities List (NPL).

## II. BACKGROUND

A Preliminary Assessment of the PFE site was completed by Ecology and the Environment Inc. on February 11, 1983. The PA recommended that a Site Inspection should be conducted at this site since some possibility exists that a release to the environment by contaminants may have occurred. Preliminary HRS screening of this site supports its eligibility to be considered for inclusion on the NPL. There is incomplete documentation on the use, storage, and chemical characteristics of the solvents used and wastes generated at the PFE site.

The PA provided the following background information on the PFE site:

The PFE has been a division of its parent company, Southern Pacific Railroad (S.P.R.R) since 1976. From 1907 to 1976, PFE was a division of Union Pacific and Southern Pacific Railroads. This company has occupied this site for 81 years, since 1907.

The PFE is located at 2501 E. Fairland Straenueve in Tucson Arizona, within Township 14 South, Range 14 East, Section 20 [(D-14-14)20]. The PFE occupies a 110 acre site, which includes approximately 30 structures and 15 railroad side tracks throughout the yard.

The PFE facility at this location cleans, repairs, and maintains refrigerated railroad cars. The refrigerated cars are equipped with diesel generators to power the refrigeration units. PFE rebuilds and repairs the generators and refrigeration units.

PFE uses and stores solvents at this location. A complete list of hazardous substances and the chemical composition of compounds used at this site is unavailable. PFE switched solvents and cleaners in 1985 to S.P.R.R approved list of compounds. These include : alkaline cleanser, Freon 113, and paint based spirits. The wastes include: spent solvents, nickel cadmium batteries, and waste oil. The cleaners and solvents used by PFE prior to 1985 are not known or documented by the facility.

Current waste generated and the disposal practices at PFE include:

- spent batteries (nickel-cadmiun/acid---licensed waste hauler
- waste lube oil---recycled by a licensed waste hauler
- spent solvent---licensed waste hauler
- drums---licensed waste hauler
- waste drums---stored on site until pickup
- agi dips sludge ( solvent dip tanks)---hauled off site by licensed waste hauler
- waste oil & stormwater runoff---discharged to use surface concrete tank with a belt skimmer to skim the oil off the water. Oil is collected in drums and hauled off site, the water and stormwater is diverted into the surface impoundment

Historic waste disposal practices are not known or documented by the facility.

The PFE rail yard is underlain by a complete storm drain system that drains the yard, shop areas, and oil and water separator. The surface water runoff drains are located throughout the facility including the drum and waste storage areas.

This storm drain system can either flow directly into the belt skimmer pond and then into the surface impoundment or it can be diverted into the surface impoundment directly. The ditch that connects the belt skimmer and the bypass gate to the surface impoundment appears to be an unlined ditch.

The surface impoundment is described in the PA as an unlined pond. PFE has stated that a PVC liner (of unknown thickness) was installed with a 1 foot cover of soil in the pond. Date of installation of the pond, as stated by PFE was 1977. However, prior to 1977 this may have been a natural drainage basin as it is located at a low elevation on the PFE facility, and all drains are gravity drains.

The surface impoundment covers approximately 5 acres and is estimated by PFE to have a depth of 10 feet. The pond is equipped with (1) a submersible pump to be used to divert excess water into the city sewer to prevent overflow, and (2) spillway on the northwest side of the pond. The spillway discharges excess water into Railroad Wash, which flows northwest into Arroyo Chico, a tributary of the Santa Cruz River to the west.

Due to the numerous surface drains throughout the PFE yard, waste disposed of, or spilled on the ground or into the drains may enter the soil via the impoundment system. In addition, excessive flow may have spilled over into the surface water arroyos. The drainage areas are a source of recharge to the Upper Santa Cruz Groundwater Basin.

Due to the limited scope of the SI program, soil sampling will be limited to on-site locations in and around the surface impoundment.

The facility is located within the northern half of the Upper Santa Cruz Basin with the Tucson Mountains four (4) miles to the east, the Tanque Verde Mountains eleven (11) miles to the northeast, the Santa Catalina Mountains eleven (11) miles to north. These mountains act as impermeable bedrock boundaries for part of the basin. The Santa Cruz River flows in a northwesterly direction and is two miles southwest of the facility.

The main source of groundwater within this basin is the sedimentary rocks and alluvium that compose the valley fill deposits. These deposits include in ascending order: the Pantano Formation, a silty sandstone to gravel; the Tinaja beds, a sandy gravel to a gypsiferous clayey silt and mudstone; the Fort Lowell Formation, unconsolidated to moderately consolidated sediments that grade from a silty gravel to a sandy silt and clayey silt; the older alluvium, unconsolidated to moderately consolidated gravel, sand, silt, and clay; and the younger alluvium,

unconsolidated gravel and sand found within the present stream courses and flood plains within the basin. The alluvial sediments have been estimated to be approximately 800 feet thick in the area of the facility.

Depth to water ranged from 82 to 301 feet below land surface within a three mile radius of the site, based on a 1982 survey. Depth to water under the site was approximately 220 feet with groundwater flow to the northeast. 1986 water level data indicated that depth to water ranged from 72 to 316 feet below land surface within a three mile radius of the site. Depth to water under the site was approximately 210 feet. Groundwater flow direction appears to still be to the northeast but possibly more northerly in direction.

This sample plan will use the most recent documented regional flow direction as the primary basis for the selection of groundwater sampling points. However, because possible hydraulic interferences (e.g. pumping wells) can affect the regional flow direction in this area, some wells were selected with that as a major consideration.



### III. MAPS

Figure 1. is a map showing the location of Pacific Fruit Express Co. facility.

Figure 2. shows the location of wells proposed for sampling and alternate well locations.

Figure 3. shows the depth to groundwater and the flow direction.

Figure 4. soil sample locations.

Figure 1 Location Map for Pacific Fruit Express

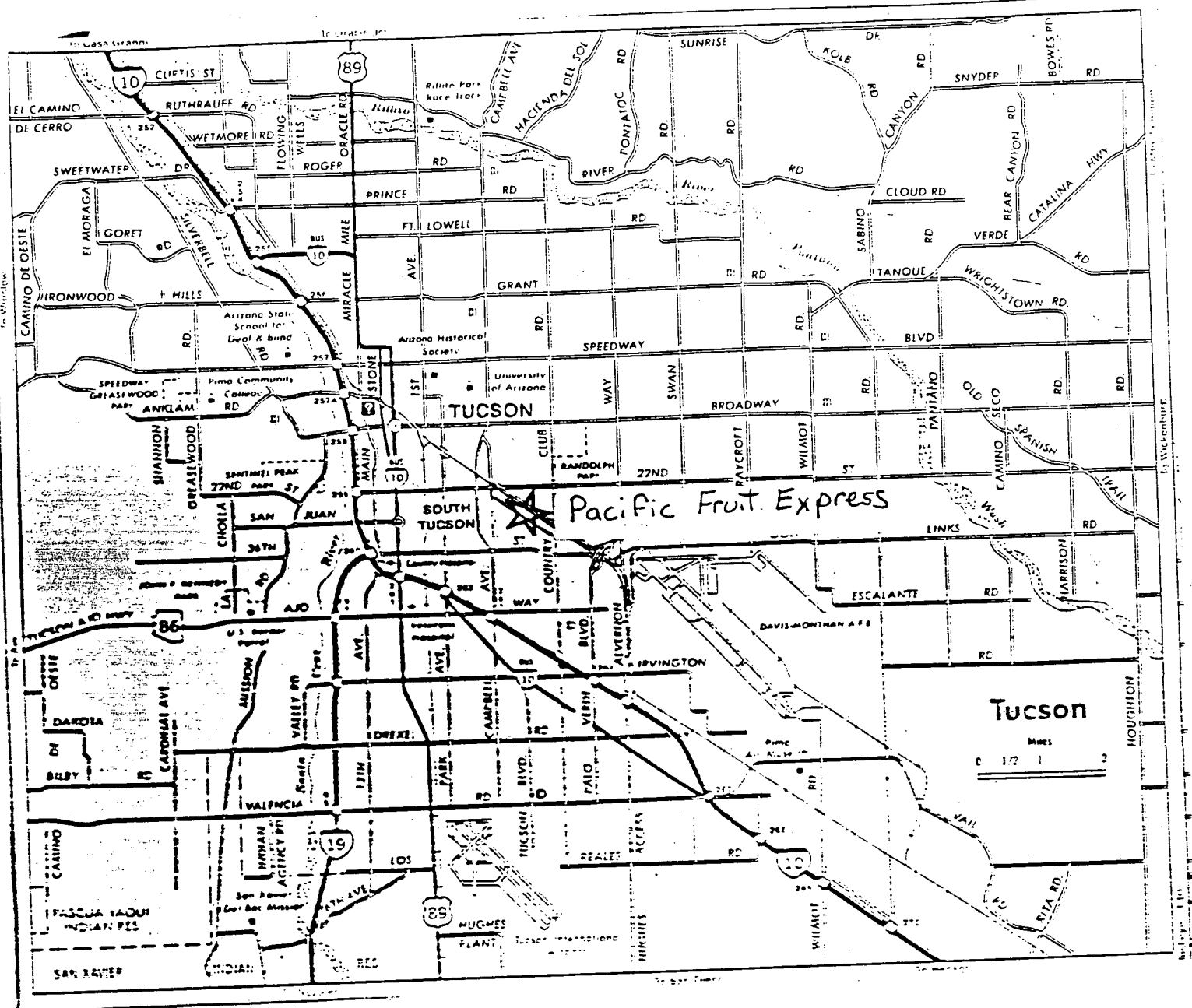


Figure 2 Wells Proposed  
for Sampling

- ⊕ wells selected
- ⊙ Alternate Wells

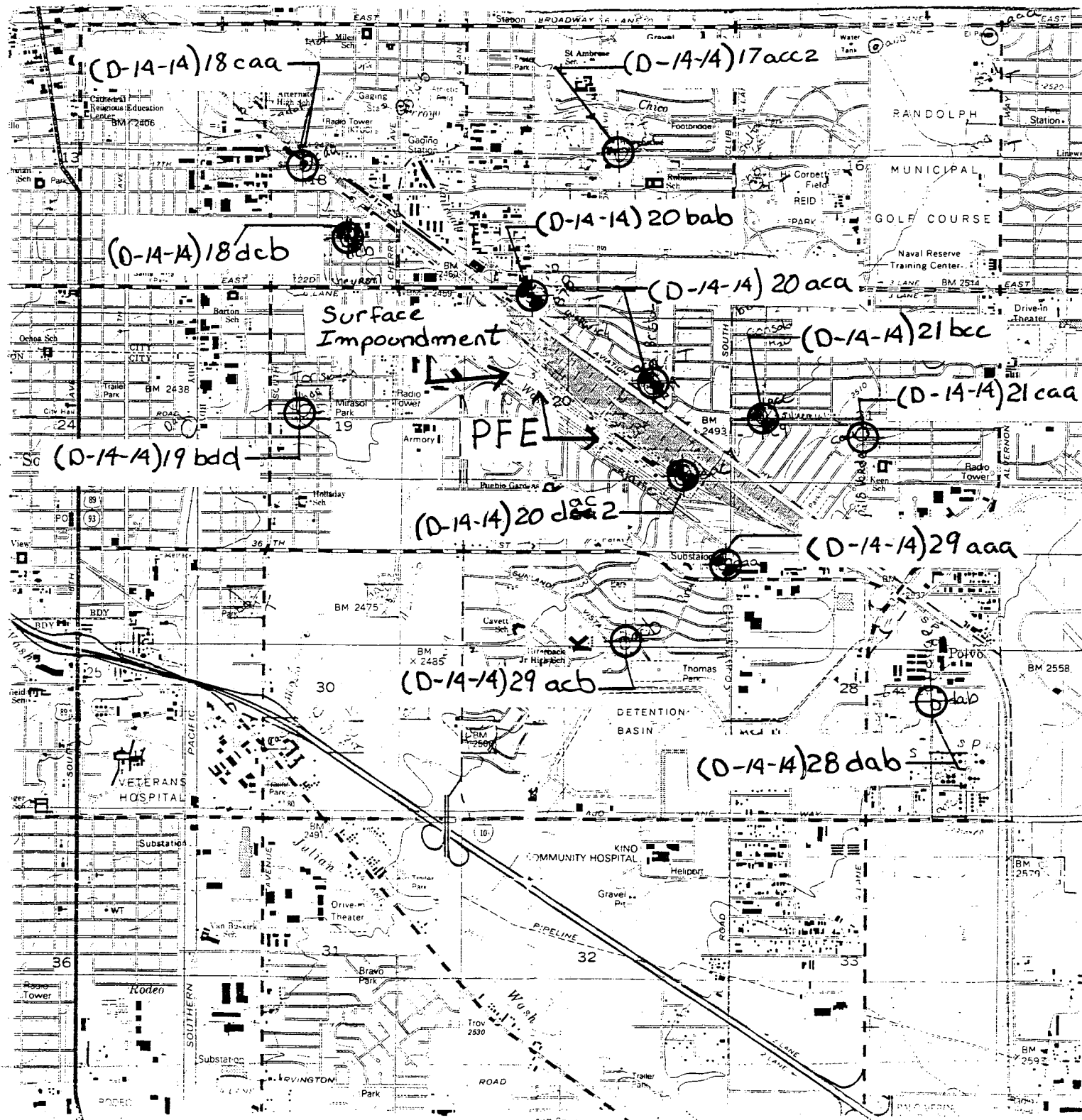
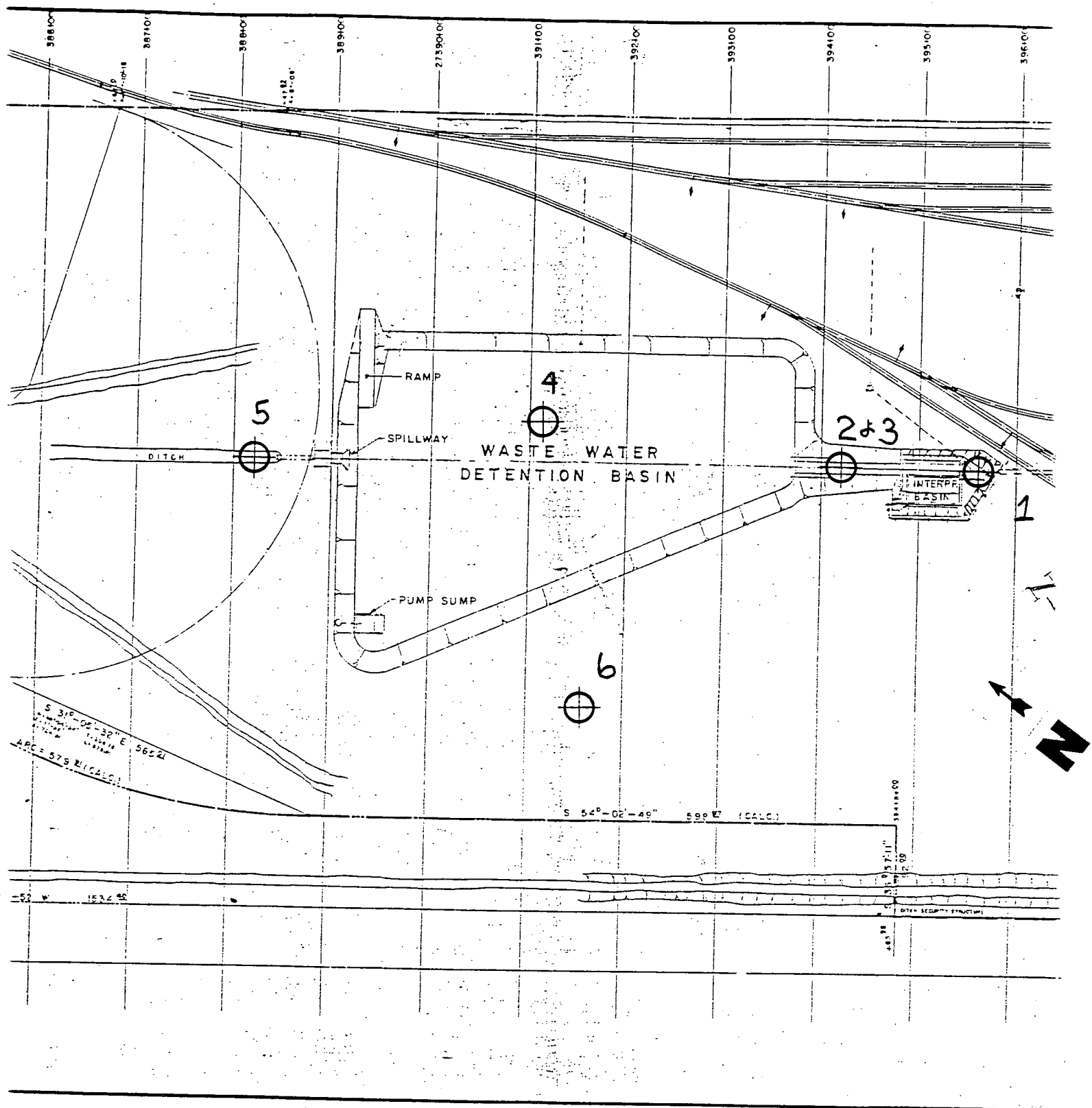




Fig 4 Soil Sample Locations



IV. RATIONALE FOR ANALYTICAL PARAMETERS, NUMBER OF SAMPLES, AND SAMPLE LOCATIONS.

A. Groundwater

In order to meet the stated objectives of the groundwater sampling effort, a total of 9 water samples will be submitted for analysis. This includes 1 travel blank, 1 duplicate, and 1 laboratory QA/QC sample. The sampling is scheduled for September 8 and 9, 1988. The sample locations are shown on Figure 2. A summary, including construction data, of the wells chosen for sampling is given in Table 1.

The 8 wells were selected as sampling points on the basis of two general considerations: (1) the northeasterly direction of regional groundwater flow as shown on published maps, and (2) the probable influence on groundwater flow direction by high-capacity wells in the immediate area around PFE.

Using this rationale, final well selection was then dependent on well construction details, well use, and drillers log availability.

Well locations selected for sampling are:

(D-14-14)29aaa COT C-3

This well is located 0.5 mile south of the PFE facility. This well was selected due to its upgradient location. This is a public supply well owned by the City of Tucson. This well will provide background water quality data for this area. This well is drilled to a depth of 735 feet.

(D-14-14)20bab COT B-78

This well is located 0.4 mile north of the PFE facility. This well is downgradient from the PFE facility. The B-78 well is drilled to a depth of 500 feet and screened from 160-500 feet below land surface. This well is a public supply well owned by the City of Tucson.

(D-14-14)20aca COT B-19 and (D-14-14)21bcc COT C-9

These wells are located 0.3 mile north and 0.5 mile north of the PFE facility respectively. These wells are both downgradient of PFE and are public supply wells owned by the City of Tucson. The B-19 well is the closest downgradient well off site. This well is drilled to a depth of 545 feet. The C-9 well is cased to a depth of 434 feet below land surface. These wells will provide data on the northeastern extent of contamination (if present) in this area.

(D-14-14)20dac2 PFE

This well is one of the two wells on site (the second well is no longer in service). There is no construction data available on this well but it is located 0.1 mile north and 0.6 mile east of the surface impoundment.

The second consideration for well selection is the possible and/or probable influence on the groundwater flow direction from high capacity wells in the immediate area around PFE.

(D-14-14)18dcb

This well is located 1 mile northwest of PFE and is drilled to a depth of 500 feet. This well is screened from 220 to 498 feet below land surface. This well is used for domestic and in the production of bottled soft drinks.

Alternate wells chosen for sampling in the event that an above well cannot be sampled are: (D-14-14)18caa; (D-14-14)19bdd; (D-14-14)21caa; (D-14-14)28dab. Well construction data for these wells are included in Table 1.

Groundwater samples from the 8 wells will be analyzed for the following parameters: Volatile Organic Compounds, Semi-Volatile Organic Compounds, Metals, and Major Cation/ Anion. The VOCs and semi-VOCs parameters were selected on the basis of the historical use of solvents at the PFE facility. The chemical composition of the solvents and other compounds used at PFE has not been documented. The inorganic parameters selected for analysis at PFE will be used to provide general aquifer quality data which will aid in better characterizing the aquifers of concern in the area.

#### B. Soils

The chemical composition of the solvents historically used and the waste generated at the PFE site is unknown. During the sampling event, which is scheduled for September 8 & 9, 1988, at the PFE facility a total of 6 soil samples will be collected. A duplicate and a background sample will be collected for QA/QC requirements.

The six (6) samples will be taken in the surface impoundment area at the following locations:

- 1) Upstream of the diversion gate in the ditch
- 2) The ditch connecting diversion gate and belt skimmer to the pond
- 3) Duplicate of the above sample location
- 4) Impoundment area ( middle if accessible)
- 5) Railroad Wash, below spillway
- 6) Background sample in desert area to the west of the pond.

See Figure 3. for locations. The sample locations will be tied into a reference point selected in the surface impoundment area.

The soil samples will be analyzed for Volatile Organics, Semi-volatile organics, and metals due to the known types of activities conducted on site.

Table 1: Well Locations, Ownership, and Construction Parameters

Well No. Location	Well Name	Owner	Casing Diameter	Screened Interval	Total Depth	Use1	Pump2
(D-14-14)17acc2	B-13	City of Tucson	16	250-320 330-330 440-470 490-500 490-550	915	F	T
(D-14-14)13caa	Ica	Crystal Ice	12	200-400	650	F	S
(D-14-14)18dcb	Kalil	Kalil Bottlers	12	220-492	500	F	S
(D-14-14)19bdd	B-33	City of Tucson	16	unknown	557	F	N
(D-14-14)20aca	B-19	City of Tucson	12	unknown	545	F	T
(D-14-14)20bab	B-73	City of Tucson	16	160-500	500	F	T
(D-14-14)20dac2	PFE	PFE	--	unknown	---	F	T
(D-14-14)21bcc	C-9	City of Tucson	14	unknown	434	F	T
(D-14-14)21caa	C-10	City of Tucson	12	unknown	502	F	N
(D-14-14)28dab	C-15	City of Tucson	16	unknown	504	F	T
(D-14-14)29aaa	C-3	City of Tucson	16	unknown	735	F	T
(D-14-14)29acb	C-8	City of Tucson	16	unknown	476	F	T

.. Use of well-D=domestic, S=Stock, I=Irrig., F=public, U=unused.  
 .. Type of pump-S=Submersible, T= turbine, N= no pump  
 ---WELLS SELECTED AS ALTERNATES



## V. REQUEST FOR ANALYSIS

The general analytical parameters and some appropriate EPA methods requested for this investigation are identified in Tables 2 and 8. The request for analysis, required preservatives and holding times for each sample are presented in Tables 3, 4, 6, and 7.

### A. Groundwater Samples

Analyses requested through the EPA Contract Lab Program (CLP) fall under both Routine Analytical Services (RAS) and Special Analytical Services (SAS). The SAS request of the CLP consists of EPA method 524 for VOCs. This method differs from method 624 by the aliquot of sample used in the analysis. To maintain a low detection limit, it is requested that the analysis be performed using a 25 ml aliquot of sample instead of the 5 ml aliquot which is normally used. By increasing the amount of sample aliquot, the detection limits of the method approach those of EPA methods 601 & 602. To properly assess groundwater contamination in the PFE area, it is necessary to quantify the contaminant concentrations to the lowest reproducible levels currently available. The compounds to be included in the Volatile Organic Analysis (VOA) are those on the CLP Target Compound List (TCL). Table 4; Volatiles, lists the specific TCL parameters and appropriate detection limits to be covered under this request.

The RAS request of the CLP is metals in groundwater (see Table 3). The samples collected for this parameter will be acidified to a pH of  $\leq 2$  with 1:1  $\text{HNO}_3$  and packed in ice prior to shipment.

Additional analytical services will be provided by the Arizona Department of Health Services (ADHS) Laboratory. These requests include semi-volatile organics by EPA method 625, and inorganic parameters. These requests are summarized in Table 4.

### B. Soils

Analyses requested through the EPA CLP fall under RAS. The RAS request of the CLP consists of EPA method 8240 for VOCs and EPA method 8270 for semi-volatiles and EPA Standard Methods for metals. The sample by sample request is given in Table 6.

Table 2: General Analytical Parameters for Groundwater Samples.

<u>RAS Parameters</u>	<u>Method</u>	<u>Laboratory</u>
Semi-volatile Organics, B/N/A	625	ADHS
Semi-volatile Organics,	625	ADHS
Metals Incl. Major Cations		CLP

<u>RAS &amp; SAS Parameters</u>	<u>Method</u>	<u>Laboratory</u>
Volatile Organics	524	CLP

<u>SAS Parameters</u>	<u>Method</u>	<u>Laboratory</u>
Alkalinity		ADHS
Hardness		ADHS
Total Dissolved Solids		ADHS
Anions		ADHS







Table 5 : Target Compound List

## VOLATILES

Compounds	Quantification Limits <sup>a,b</sup>	
	Low Water ug/L	Low Soil/Sediment ug/Kg
Chloromethane	10	10
Bromomethane	10	10
Vinyl chloride	10	10
Chloroethane	10	10
Methylene Chloride	5	5
Acetone	10	10
Carbon disulfide	5	5
1,1-Dichloroethene	5	5
1,1-Dichloroethane	5	5
Dichloroethene (Total)	5	5
Chloroform	5	5
1,2-Dichloroethane	5	5
2-Butanone	10	10
1,1,1-Trichloroethane	5	5
Carbon Tetrachloride	5	5
Vinyl Acetate	10	10
Bromodichloromethane	5	5
1,1,2,2-Tetrachloroethane		5
1,2-Dichloropropane	5	5
trans-1,3-Dichloropropene	5	5
Trichloroethene	5	5
Dibromochloromethane	5	5
1,1,2-Trichloroethane	5	5
Benzene	5	5
cis-1,3-Dichloropropene	5	5
Bromoform	5	5
2-Hexanone	10	10
4-Methyl-2-Pentanone	10	10
Tetrachloroethene	5	5
Toluene	5	5
Chlorobenzene	5	5
Ethyl Benzene	5	5
Styrene	5	5
Total xylenes	5	5

<sup>a</sup> Quantification Limits for medium concentration water and soil/sediment samples are 100 times those for the low concentration samples.

<sup>b</sup> Quantification Limits may vary due to inadequate sample size or analytical problems associated with a sample (e.g. blank contamination).

Table 5 : Target Compound List (Cont)

## SEMI-VOLATILES

Compounds	Quantification Limits <sup>b</sup>	
	Low Water <sup>d</sup> ug/L	Low Soil/Sediment <sup>e</sup> ug/Kg
N-Nitrosodimethylamine	10	330
Phenol	10	330
bis(2-Chloroethyl) ether	10	330
2-Chlorophenol	10	330
1,3-Dichlorobenzene	10	330
1,4-Dichlorobezene	10	330
Benzyl alchohol	10	330
1,2-Dichlorobenzene	10	330
2-Methylphenol	10	330
bis(2-Chloroisopropyl ether)	10	330
4-Methylphenol	10	330
N-Nitrosodipropylamine	10	330
Hexachloroethane	10	330
Nitrobenzene	10	330
Isophorone	10	330
2-Nitrophenol	10	330
2,4-Dimethylphenol	10	330
Benzoic acid	50	1600
bis(2-Chloroethoxy) methane	10	330
2,4-Dichlorophenol	10	330
1,2,4-Trichlorobenzene	10	330
Naphthalene	10	330
4-Chloroaniline	10	330
Hexachlorobutadiene	10	330
4-Chloro-3-methylphenol (para-chloro-meta-cresol)	10	330
2-Methylnaphthalene	10	330
Hexachlorocyclopentadiene	10	330
2,4,6-Trichlorophenol	10	330
2,4,5-Trichlorophenol	50	1600
2-Chloronaphthalene	10	330
2-Nitroaniline	50	1600
Dimethyl phthalate	10	330
Acenaphthylene	10	330
3-Nitroaniline	50	1600
Acenaphthene	10	330

Table 5 : Target Compound List (Cont)

## SEMI-VOLATILES (cont.)

Compounds	Quantification Limits <sup>c</sup>	
	Low Water <sup>d</sup> ug/L	Low Soil/Sediment <sup>e</sup> ug/Kg
2,4-Dinitrophenol	50	1600
4-Dinitrophenol	50	1600
Dibenzofuran	10	330
2,4-Dinitrotoluene	10	330
2,6-Dinitrotoluene	10	330
Diethyl phthalate	10	330
4-Chlorophenyl phenyl ether	10	330
Fluorene	10	330
4-Nitroaniline	50	1600
4,6-Dinitro-2-methylphenol	50	1600
4-Bromophenyl phenyl ether	10	330
Hexachlorobenzene	10	330
Pentachlorophenol	50	1600
Phenanthrene	10	330
Anthracene	10	330
Di-n-butyl phthalate	10	330
Fluoranthene	10	330
Pyrene	10	330
Butyl benzyl phthalate	10	330
3,3'-Dichlorobenzidine	20	660
Benzo(a)anthracene	10	330
bis(2-ethylhexyl)phthalate	10	330
Chrysene	10	330
Di-n-octyl phthalate	10	330
Benzo(b)fluoranthene	10	330
Benzo(k)fluoranthene	10	330
Benzo(a)pyrene	10	330
Indeno(1,2,3-cd)pyrene	10	330
Dibenz(a,h)anthracene	10	330
Benzo(g,h,i)perylene	10	330

<sup>c</sup> Quantification Limits may vary due to inadequate sample size or analytical problems associated with a sample (e.g. blank contamination).

<sup>d</sup> Quantification Limits for medium concentration water samples are 100 times those for the low concentration samples.

<sup>e</sup> Quantification Limits for medium concentration soil/sediment samples are 60 times those for the low concentration samples.

Table 5 Cont.

## METALS &amp; CYANIDE

<u>Element</u>	Quantification Limits <sup>f,g</sup>
	<u>Water</u> <u>ug/L</u>
Aluminum	200
Antimony	60
Arsenic	10
Barium	200
Beryllium	5
Cadmium	5
Calcium	5000
Chromium	10
Cobalt	50
Copper	25
Iron	100
Lead	5
Magnesium	5000
Manganese	15
Mercury	0.2
Nickel	40
Potassium	5000
Selenium	5
Silver	10
Sodium	5000
Thallium	10
Vanadium	50
Zinc	20
Cyanide	10

<sup>f</sup> Quantification Limits for soil/sediment samples are dependent on the percentage of solids in the sample (dry weight).

<sup>g</sup> Quantification Limits may vary due to inadequate sample size or analytical problems associated with a sample (e.g. blank contamination).



Table 6: SAS Parameters

<u>Parameter</u>	<u>Method</u>	<u>Quantification Limits (ppm)</u>
Volatile organics <sup>a</sup>	524	-- <sup>b</sup>
Chloride	325.3	1
Fluoride	340.1	0.5
Nitrite	354.1	0.1
Sulfate	375.2	5
Total dissolved Solids	160.3	10
Hardness	130.1 or 130.2	10
Alkalinity	310.1 or 310.2	--
Specific Conductance	Measured in the field	
pH	Measured in the field	
Temperature	Measured in the field	

<sup>a</sup> Only the Volatile Organics Parameter is requested through the CLP. The remaining SAS parameters are requested through the ADH laboratory.

<sup>b</sup> The Federal Register, Vol. 49, No. 209, October 26, 1984 lists a range of detection limits for methods 601 & 602 as 1.81 ug/L to 0.02 ug/L and 0.4 ug/L to 0.2 ug/L respectively. These detection limits approximate those of method 524. See Table 4.

See Tables 3 and 4 and Appendix D for sample preservation and holding times.

1  
6  
Table 6 Request for Analysis, matrix = soils  
(all samples @ low concentrations)

ANALYSES REQUESTED	VOLATILE ORGANICS EPA Method 8240	SEMI-VOLATILE ORGANICS EPA Method 8270	METALS EPA Standard Methods
Preserve/Handling	Chill to 4 C	Chill to 4 C	Chill to 4 C
Analytical Hold Time	< 14 days	< 14 days	< 14 days
Contract Hold Time	< 14 days	< 14 days	< 14 days
Type of Bottle per Analysis	120 ml wide mouth glass vials	3 oz. wide mouth glass jar	3 oz. wide mouth glass jar
Sample Location	Sample Collection Schedule	No. of Containers/ Analysis/Sample	No. of Containers/ Analysis/Sample
soil # 1	9/8/88	2	1
soil # 2	9/8/88	2	1
soil # 3	9/8/88	2	1
soil # 4	9/8/88	2	1
soil # 5	9/8/88	2	1
soil # 6 a duplicate of # 2	9/8/88	2	1
		1	1

Total: 6 soil  
5 sample collection points

QA/QC: 1 duplicate sample  
1 background sample

## VI. METHODS AND PROCEDURES

### A.1 Access To The Well

Access to domestic wells will not be a problem since permission has already been granted by appropriate landowners to sample. Each landowner will be notified by mail of the date and approximate time of day of sampling. In addition, landowners will be contacted by phone to confirm the schedule a few days prior to sampling. In order to gain access to the monitor well a representative of the City of Tucson will accompany ADEQ personnel to the wellsite.

### A.2 Safety Survey

The initial safety survey at each well will be performed the first day on the site to determine the level of protection necessary for field operations at the wellhead (the HNU will be used ).

### A.3 Measure Physical Parameters of the Well

The description of the measuring point, the height of the measuring point above land surface and the inside diameter (I.D.) of the well casing will be recorded. The static water level will then be recorded by use of a sounder cable or steel tape. The time of the measurements, equipment used, depth to water, and well depth will be recorded in a bound, waterproof field notebook and on the appropriate data sheet (see Appendix A). The sounder probe and the attached cable will be decontaminated using the same protocols used with sampling equipment.

### A.4 Well Purging Procedures

All wells to be sampled with dedicated pumps. These pumps will effectively purge the wells.

#### A.4.a Well Purging Volume

The quantity of water that will be removed from the casing prior to sampling will be a minimum of three casing volumes. This required volume is determined by the following formula:

$$V = \frac{7.48}{144} \frac{D^2}{4} L$$

Where: V = volume of water in the well  
(gallons)  
D = inside diameter of the well  
(inches)  
L = height of standing water in  
the well (feet)

Table 8 may be used to assist in calculating casing volumes by this formula.

Table 8: Liquid volume in a one foot section of well casing

<u>Casing Inside Diameter</u> (inches)	<u>Volume of Water/ft casing</u> $V = 0.0408 \times (I.D.)^2$ (gallons)
1	0.04
1.5	0.09
2	0.16
4	0.65
6	1.47
8	2.61

If the recovery rate of the well is sufficient, three well volumes will be evacuated. Wells with an insufficient recovery rate are discussed in Section A.4.b. The discharge of each well will be measured in the field. This, along with the volume of standing water in the well, will be used to determine the pumping time required to evacuate a minimum of three borehole volumes of water.

When a teflon bailer or a portable submersible pump is used to purge a well the following procedures will be observed:

- 1) Measure depth to water by sounder.
- 2) Determine total depth of well by using sounder cable or by using recorded construction parameters.
- 3) Measure inside diameter of casing.
- 4) Calculate water volume to be purged by given formula.
- 5) Lower bailer and or the submersible pump and begin purge. While tripping in, decontaminate the bailer cable or the pump line and discharge hose as specified in sampling decontamination protocols. Bailed or pumped water may be discharged to the ground. When the portable submersible pump is used to purge the well the sample will be collected in the teflon bailer.

ADEQ sampling personnel will record the following information during purging of the well:

- 1) Specific sample location.
- 2) Depth to water.
- 3) Type of purging equipment used and pertinent information. For submersible pumps this includes; horsepower, manufacturer and date of manufacture, pump model and serial number, wellhead apparatus and

screened interval where sample is collected.

4) Date and time purge initiated and completed.

5) Physical properties of evacuated water:

- \* Color,
- \* Odor,
- \* Turbidity,
- \* Presence of visible hydrocarbons or organic compounds.

6) Depth and length of screened interval.

7) Volumes purged (calculated and actual)

8) Decontamination and cleaning procedures for equipment used to sample more than one well.

The information will be recorded on the appropriate data sheet (see Appendix A).

#### A.4.b Procedures For Slow Recharging Wells

When wells recharge slowly (e.g. overnight or longer to recharge a borehole volume) the three casing volume minimum excavation requirement may need to be waived. In these situations, the volatile organic samples will be collected as soon as possible. The other samples will be collected after sufficient volume has accumulated.

#### A.5. Groundwater Sample Collection

The sampling and sample handling procedures which will be employed are as follows:

- 1) All sampling equipment which comes into contact with the liquids in the well must be cleaned in accordance with the procedures in Appendix B, taken from the "Protocol For Groundwater Evaluations" dated September 1986.
- 2) Sampling personnel must wear a clean pair of disposable gloves at each sampling location.
- 3) Field blanks will be collected near the end of the sampling day by the same team members who collect the suspected contaminant samples. If a bailer is used to collect the sample, an equipment blank will also be collected. This blank will be from last rinse of distilled water after the bailer has been decontaminated. Members of the same team that collected the samples will collect the equipment blank.

- 4) One member of the sampling team will take records and field measurements (pH, Conductivity and Temperature) while the other member conducts the sample collection.
- 5) The sample collection sequence will follow the order in which the parameters are listed on Table 3.

Sufficient sample material will be obtained so that all of the parameters can be analyzed. The CLP bottle repository will provide the containers for volatile organic analysis (VOA), semi-volatiles and metals analysis. The necessary preservatives will be added in the field immediately prior to collecting the sample.

#### A.6 Well Sampling Procedures

As soon as possible after three casing volumes have been evacuated from the borehole sample collection will commence. In wells equipped with dedicated pumps, samples for all parameters will be collected while the pump is running. When samples are collected by bailing, the bailer will be lowered to just below the water surface.

#### A.7 Field Parameters

Three field parameters will be measured while each well is being sampled: temperature, pH and specific conductance. The measurements will be taken by pH/temperature and conductivity meters. These parameters will continue to be measured until the readings stabilize. Once the values for these parameters are stable, sample collection may commence. The results of the measurements will be recorded on the appropriate data sheets (see Appendix A). All instruments will be calibrated (with reference solutions) prior to taking readings in the field.

#### A.8 Sample Filtration

The samples will not be filtered.

#### B. Soil Sampling

The soil samples will be collected at locations shown in Figure--- using the following procedure:

- A hand auger ( a stainless steel Iwan type auger) will be used to obtain soil samples at depths of 1 to 4 feet. The variation in sample depth is due to unknown soil conditions in the pond and ditch and the possible presence of a PVC liner in the pond. If a liner is encountered, the auger will not be allowed to penetrate it.
- The HNU will be used to screen for contamination and aid in selecting the depth at which to sample.
- The samples will be collected in 8 oz. jars supplied by the CLP program as shown in Appendix C.

- The samples will be placed in coolers on ice prior to shipment.

Between samples the sampling equipment (i.e. auger) will be decontaminated as follows:

- Brush off visible mud or dirt; scrub and wash with tap water.
- Scrub with nonphosphate detergent soap.
- Scrub with hexane.
- Rinse with de-ionized water.

#### C. Disposal of Contaminated Material

No drilling or boring activity is included in this sampling effort, therefore no contaminated cuttings will need to be containerized. Any cuttings resulting from auger drilling will be replaced in the sample hole.

The collection of purge water will not be necessary. Proposed Arizona Rule R18-9-114.D states that "A General Permit is issued for surface impoundments which receive water from the evacuation of a well for purposes of water quality sampling, hydrologic parameter testing, well development or well redevelopment, provided that the discharged water does not violate Aquifer Quality Standards or further degrade the quality of water in the affected aquifer". Because the purge water will not further degrade the groundwater, the evacuated water will be discharged to the ground.

#### E. Equipment Decontamination

Decontamination of all field equipment will be completed prior to use. Field apparatus probes will be rinsed with decon (de-ionized, organic free) water prior to each measurement. Decontamination procedures for sampling equipment will follow the procedures identified in the "Protocol for Groundwater Evaluations" which is given in Appendix B.

#### F. Sample Containers

All sample containers for CLP constituents will be provided to the ADEQ sampling team from the CLP bottle repository. Sample containers for the SAS parameters to be analyzed by the ADHS laboratory will be provided by the ADHS laboratory. Appendix C is a summary of sample container types, volumes, materials and preservation methods to be employed in this sampling effort.

For the VOA parameter, an 80 ml aliquot for each sampling site is required by the CLP. These samples will be collected in 2 x 40 ml vials. All VOA samples will be checked for zero head space (e.g. no air bubbles). Collection of samples for Semi-volatiles

analysis requires four 1-liter amber glass bottles. Samples for inorganic analyses including metals, major anions, alkalinity, hardness and total dissolved solids will be collected in a prepared set of 3 x 1 liter Polyethylene bottles per sampling site. One of the 1 liter polyethylene ( for dissolved metals ) will be sent to the CLP lab.

G. Sample Preservation and Handling Procedures

Preservation of low concentration groundwater samples by acidification is now required by EPA Region IX for analysis of samples by both EPA methods 601 and 624. Samples collected for the VOA parameter are preserved by the addition of 2 drops of 1:1 HCL. The Dissolved Metals method require samples to be acidified to a pH of  $\leq 2$  by the addition of  $\text{HNO}_3$ . For the inorganic analyses, including metals, samples will be collected in 3 x 1 liter polyethylene bottles. Two of these bottles will contain an added preservative while the third bottle will contain no preservative. The preserved bottles will acidified to a pH of  $\leq 2$  with 1:1  $\text{HNO}_3$  and 1:1  $\text{H}_2\text{SO}_4$  respectively. These preservatives will be added to the sample containers by the ADEQ sampling team prior to collecting the sample. All samples, immediately upon collection, will be chilled to 4° in coolers.

Analytical and CLP hold times for RAS and common SAS parameters are given in Appendix D. To avoid exceeding hold times, all appropriate samples will be sent to the CLP laboratory by Federal Express to ensure overnight delivery. Samples which are submitted to the ADHS laboratory will be personally delivered at the end of each sampling day.

H. Sample Shipment

All samples will be shipped in coolers with appropriate traffic reports or sample ID labels, chain-of-custody seals, SAS packing lists and chain-of-custody forms. Each individual bottle will have a chain-of-custody seal across its cap. The sample ID labels will be printed in waterproof ink and taped to the container to prevent them from coming off when wet. The samples will be securely packaged and sealed in plastic bags. Soil, waste, and solvent samples containers will be sealed in metal paint cans prior to placement in the cooler for shipment to the CLP lab. The forms will be packaged in a waterproof plastic bag and securely taped to the underside of the cooler lid. Empty space in the cooler will be filled with material to cushion the samples and prevent breakage during shipment. Samples will be shipped on the same day that they are collected. Coolers used for shipping will be securely taped shut.

All shipments of samples will reported daily to the EPA Region IX RSCC. This notification will include such information as well name and legal location, case number &/or SAS number, total number of samples shipped, CLP laboratory, carrier and method of



shipment, shipment date and any special handling requirements or anticipated problems.

## I. Sample Documentation

Sample documentation involves the entry of data into log books and the generation of field data records, SAS packing lists, chain-of-custody forms and sample data sheets.

### I.1 Field Notebooks

Each member of the ADEQ sampling team will document all field activities of the day in a bound, Teledyne log book. Data entries will be legible and recorded with waterproof ink. All pertinent information such as sampling locality, cadastral number, time and date of sampling, time of field measurements, wellhead information, owner name and address, weather conditions, calculations, safety precautions and observations or comments will be recorded.

### I.2 Field Data Sheets

The field data sheets will be filled out by the ADEQ sampling team as they conduct the work. These forms will be submitted to EPA Region IX.

### I.3 Sample Traffic Reports, SAS Packing Lists, Sample Data Sheets and Chain-of-Custody Records

The collection of each sample will be documented on SAS packing lists and on organic and inorganic traffic reports. The third and forth copies of these forms will be sent with the samples to the appropriate laboratory. The top copy will be sent to the Sample Management Office while the second copy goes to EPA Region IX.

All samples will be sent through chain-of-custody procedures as per NEIC Policies and Procedures; EPA publication #33019-78-001-R. The original record will accompany the shipment and copies will be sent to the Region IX RSCC. Until transferred, custody and security will be the responsibility of the ADEQ sampling team. Each separate sample container or bag of sample containers will be sealed with a gummed custody seal prior to shipment. Samples will then be placed in coolers which will be securely taped shut and sealed with a gummed custody seal. Chain-of-custody is satisfied when the samples arrive at the CLP laboratory with the seals intact and the form is signed by lab personnel.

Samples for ADHS Laboratory analytes will be delivered directly to the ADHS State Laboratory under identical chain-of-custody procedures. Upon transfer of the samples, the form is signed by both the receiving and transferring parties.

#### I.4 Labeling and Packaging

Collected samples will be labeled and numbered with indelible ink by well name, cadastral number, time and date of sampling, the analysis requested and type (if present) of preservative. All information recorded on labels will also be entered into the field notebooks.

#### J. Quality Assurance/Quality Control

To assure the quality of data obtained during the sampling phase of the SI, several types of QC samples will be collected and analyzed. These are as follows:

- \* Replicates,
- \* Blanks,
- \* Background and
- \* Laboratory QC samples.

##### J.1 Replicate Samples

One replicate sample will be prepared for every ten samples collected. At least one replicate sample will be collected for each parameter until the entire parameter set has been matched. The replicate samples will then be included in the set of regular samples and submitted to the analytical laboratories. The replicate sample selected is the PFE Well [(D-14-14)20dac2]. It is noted that all QC samples including replicates, blanks, background and lab QC samples are submitted for analysis in the same manner as the other field samples with no distinguishing marks or labels. QC samples will be submitted for both RAS and SAS sets of parameters.

##### J.2 Blanks

Two types of QC blanks are recommended as safeguards to identify possible laboratory and field contamination of samples. They are:

- \* Field blanks and
- \* Equipment blanks

Field blanks are used to determine if contamination is being introduced by the sampling environment. A container of certified organic-free water is carried to the field from which a sample is prepared for each group of analytes. The blank is prepared in the same manner and with the same preservatives as samples obtained from the wells. It is collected near the end of each sampling day at a predetermined sampling site.

Analysis of equipment blanks indicates if contamination is introduced by the sample collection equipment. Since all water samples will be collected with dedicated pumps, no equipment blank will be collected.

### J.3 Background Sample

One background sample will be collected from an offsite well considered to be upgradient from the PFE facility. The well selected as a background sample is (D-14-14)29aaa and which is south of the PFE facility. A background sample provides evidence of ambient groundwater conditions for the area surrounding the site. An understanding of ambient groundwater quality is necessary to determine the potential contribution from the PFE to contaminants detected in groundwater taken from wells adjacent to the site.

### J.4 Laboratory QC Samples

Laboratory Quality Control samples are analyzed by the EPA contract laboratory as part of the CLP standard laboratory quality control protocols. A spike is added to these samples to determine the reproducibility of the test methods and effectiveness of quantitative techniques used in the CLP lab. Samples chosen for lab QC will be selected in the field from wells known or suspected to be contaminated. The container labels, traffic reports and chain-of-custody for these samples will identify them as those selected for laboratory QC. The well selected for this sample is the PFE well at (D-14-14)20dac2.

## VII. SITE SAFETY PLAN

Site Name: Pacific Fruit Express

### A. Health and Safety Considerations

<u>Area of Concern</u>	<u>Hazard Potential</u>			
	<u>Low</u>	<u>Med</u>	<u>High</u>	
Explosion:	<u>X</u>	<u>      </u>	<u>      </u>	<u>      </u>
O2 Deficiency: (e.g. Confined Spaces)	<u>X</u>	<u>      </u>	<u>      </u>	<u>      </u>
Radiation:	<u>X</u>	<u>      </u>	<u>      </u>	<u>      </u>
Toxic Gases:				
a. General (HNU meter)	<u>X</u>	<u>      </u>	<u>      </u>	<u>      </u>
b. Specific: (e.g. Sorbent or Detector Tube)	<u>      </u>	<u>      </u>	<u>      </u>	<u>      </u>
Skin/Eye Contact:	<u>X</u>	<u>      </u>	<u>      </u>	Level "D" body protection, dis- posable gloves
Heat/Cold Stress:	<u>      </u>	<u>      </u>	<u>X</u>	Provide adequate supply of cold water
Falling Objects: (e.g. Stacked barrels, etc.)	<u>X</u>	<u>      </u>	<u>      </u>	<u>      </u>
Falls: (e.g. pits, ponds, elevated work place, etc.)	<u>X</u>	<u>      </u>	<u>      </u>	Steel-toed boots
Confined Spaces: (e.g. manholes, vaults, closed rooms, trenches, etc.)	<u>X</u>	<u>      </u>	<u>      </u>	<u>      </u>
Mechanical:	<u>X</u>	<u>      </u>	<u>      </u>	Normal precaution when working with electrical and mechanical equipment
Electrical:	<u>X</u>	<u>      </u>	<u>      </u>	

- B. Acute Exposure Symptoms of Compounds Present or Suspected (See also Table 1. Atmospheric Hazard Guidelines. For specific compounds, reference material is available from the Health & Safety Officer).

Compound	Applicable Std. (STEL, TLV, etc.)	Symptoms	First Aid

- C. Overall Hazard Assessment (Toxicity, flammability, reactivity, stability, operational hazards with sampling, decontamination, etc.)

Low

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Level of Protection Needed: A \_\_\_\_\_ B \_\_\_\_\_ C \_\_\_\_\_ D X

NOTE: FOR LEVEL "C" PROTECTION AND HIGHER, REVIEW AND APPROVAL OF THIS SITE SAFETY PLAN IS REQUIRED BY THE DEQ HEALTH & SAFETY OFFICER.

#### D. Equipment and Procedures

1. Hazard Surveillance Equipment & Materials: HVU meter air levels will be monitored prior to sampling. The action level for upgrading to Level "C" is a continuous (2-3 min.) HNU reading of 5ppb above background in the breathing zone.

2. Entry Procedures: Level "D" protection indicated. Entry to well is coordinated with well-owner, AZ Water Company and MCWCD.

3. Special Equipment, Materials, Procedures, (Note: Level "D" basic supplies are required as per DEQ "Personnel Safety Manual"):  
Level "D" base supplies as per "DEQ Safety Manual" Decon water, first aid kits, fire extinguisher and disposable gloves.

Stand-by equipment - (to be used if indicated by HNU Reading.)

Full face respirators with organic vapor cartridges, safety boots, safety gloves, hard hats.

4. Decontamination Equipment & Procedures: (as they relate to health & safety)

Sounder decontaminated with Hexane and de-ionized water. Meter probes rinsed with de-ionized water.

Decon-water used at the Pacific Fruit Express facility will be disposed of on

5. Disposal Procedures (contaminated equipment, supplies, etc.):

Disposable items used for water, soil, and waste sampling will be disposed of at the Pacific Fruit Express facility.

E. Emergency Information:

1. Nearest Hospital Emergency Room: Kino Community Hospital

Address: 2800 E. Ajo Way, Tucson, AZ Telephone: 294-4471

2. Emergency Telephone Numbers:

a. Fire: 911

b. Police: 911

c. Ambulance: 911

3. Poison Management Center, St. Lukes Hospital: 1-800-362-0101

4. Arizona Radiation Regulatory Agency: 1-255-4845

F. Approvals:

1. Safety Plan Prepared by: Judy Heywood, Hydrologist Date: Aug., 1988

2. Supervisor/Title: Charles H. Graf, Mgr. Superfund Hydrology Unit Date: 8-19-88

3. DEQ Health & Safety Officer: \_\_\_\_\_ Date: \_\_\_\_\_  
(Not required for level D)

TABLE 1. ATMOSPHERIC HAZARD GUIDELINES

Monitoring Equipment	Hazard	Ambient Level	Action
Combustible gas indicator	Explosive atmosphere	10%LEL	Continue investigation
		10-25%	Continue on-site monitoring with extreme caution as higher levels are encountered.
		25%LEL	Explosive hazard; withdraw from area immediately.
Oxygen concentration meter	Oxygen	19.5%	Monitor wearing SCBA. NOTE: Combustible gas readings are not valid in atmospheres with less than 19.5% oxygen.
		19.5-25%	Continue investigation with caution. SCBA not needed, based on oxygen content only.
		25.0%	Discontinue inspection; fire hazard potential. Consult specialist.
Radiation Survey	Radiation	1 mR/hr	Continue investigation. If radiation is detected above background levels, this signifies the presence of possible radiation sources; at this level, more thorough monitoring is advisable. Consult specialist.
		10 mR/hr	Potential radiation hazard; evacuate site. Continue monitoring only upon the advice of a health physicist.
Colorimetric tubes	Organic & inorganic vapors/gases	Depends on species	Consult standard reference manuals for air concentrations/toxicity data.
HMU photoionizer	Organic vapors/gases	1) Depends on species	Consult standard reference manuals for air concentrations/toxicity data.
		2) Total response mode	Consult EPA Standard Operating Procedures
Organic vapor analyzer	Organic vapors/gases	1) Depends on species	Consult Standard reference manuals for air concentrations/toxicity data.
		2) Total response mode	Consult EPA Standard Operating Procedures.

NOTE: REFERENCE - INTERIM STANDARD OPERATING SAFETY GUIDES, OFFICE OF WASTE MANAGEMENT, HAZARDOUS RESPONSE SUPPORT DIVISIONS, REVISED 1987.

Appendix A

Field Data Forms For Groundwater Investigations



1/87

Well # \_\_\_\_\_

STATIC WATER LEVEL AND WELL

CONSTRUCTION DATA

Personnel: \_\_\_\_\_

Date / Time: \_\_\_\_\_

Weather Conditions (temp, sky) \_\_\_\_\_

HNU / OVA / PHOTOVAC: Model # \_\_\_\_\_ Reading: \_\_\_\_\_

Radiation Survey Meter: Make/Model \_\_\_\_\_ Reading: \_\_\_\_\_

Outer Casing ID: \_\_\_\_\_ Casing Type: \_\_\_\_\_ Ht. above Grd. \_\_\_\_\_

Inner Casing ID: \_\_\_\_\_ Casing Type: \_\_\_\_\_ Ht. above Grd. \_\_\_\_\_

Well Condition (outside & downhole): \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Sounder Make/Model: \_\_\_\_\_

Reference Point: \_\_\_\_\_

Depth to Floating Immiscibles (FI) = \_\_\_\_\_

Depth to Water (DW) = \_\_\_\_\_

Depth to Heavy Immiscibles (HI) = \_\_\_\_\_

Measured Depth to Bottom (DB) = \_\_\_\_\_

Thickness of Floating Immiscibles (DW - FI) = \_\_\_\_\_

Thickness of Heavy Immiscibles (DB - HI) = \_\_\_\_\_

Height of Water Column, no Heavy Immiscibles present (H) = DB - DW = \_\_\_\_\_

Height of Water Column, Heavy Immiscibles present (H) = HI - DW = \_\_\_\_\_

1 Casing Volume (CV) = ID mult x H = \_\_\_\_\_

Desired Purge Volume (3 CV) = \_\_\_\_\_

2" ID mult = 0.16

4" ID mult = 0.65

6" ID mult = 1.47

8" ID mult = 2.61

1/87

Well # \_\_\_\_\_

PURGE DATA

Personnel: \_\_\_\_\_

Equipment Type: Centrifugal Pump / Bladder Pump / Peristaltic Pump/ Bailer

Make/Model # \_\_\_\_\_

Intake Depth: \_\_\_\_\_ Discharge Rate: \_\_\_\_\_

	1st Purge	2nd Purge	3rd Purge
DTW prior to purge			
Date/Time Initiated			
Date/Time Completed			
volume evacuated			
Characterize Purge Water:			
color			
odor			
turbidity			
other			

Total Volume Purged: \_\_\_\_\_

Comments: \_\_\_\_\_  
\_\_\_\_\_

1/87

GROUND WATER SAMPLE DATA SHEET

Well # \_\_\_\_\_

EQUIPMENT CALIBRATION

Personnel: \_\_\_\_\_ Date/Time: \_\_\_\_\_ Routine / Malfunction

	standard	reading		standard	reading
pH	(		EC	(	
	(			(	
	(			(	
	(			(	

FIELD PARAMETERSStart of Sampling

Personnel: \_\_\_\_\_

Date/Time: \_\_\_\_\_

	1	2	3	4
pH				
Temp (C)				
Temp Fact				
EC x				
EC <sub>25</sub>				

Completion of Sampling

Personnel: \_\_\_\_\_

Date/Time: \_\_\_\_\_

	1	2	3	4
pH				
Temp (C)				
Temp Fact				
EC x				
EC <sub>25</sub>				

pH meter make/model/serial #: \_\_\_\_\_

EC meter make/model/serial #: \_\_\_\_\_

SAMPLE COLLECTION

Sampling Personnel: \_\_\_\_\_

Weather Conditions (Temp, Sky Cond): \_\_\_\_\_

Date/Time Start: \_\_\_\_\_ Date/Time Complete: \_\_\_\_\_

Depth to Floating Immiscibles: \_\_\_\_\_ Depth to Heavy Immiscibles: \_\_\_\_\_

Depth to Water: \_\_\_\_\_ Sample Collection Depth: \_\_\_\_\_

Sample Collection Method: \_\_\_\_\_

Sample Equipment make/model: \_\_\_\_\_

SAMPLE NUMBERSFACILITY

Sample: \_\_\_\_\_

Dup: \_\_\_\_\_

If first sampling incomplete, identify parameters collected:

_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

GROUND WATER SAMPLE COLLECTION (2nd Increment)

Sampling Personnel: \_\_\_\_\_

Weather Conditions (Temp, Sky Cond): \_\_\_\_\_

Date/Time Start: \_\_\_\_\_ Date/Time Complete: \_\_\_\_\_

Depth to Floating Immiscibles: \_\_\_\_\_ Depth to Heavy Immiscibles: \_\_\_\_\_

Depth to Water: \_\_\_\_\_ Sample Collection Depth: \_\_\_\_\_

Sample Collection Method: \_\_\_\_\_

Sample Equipment make/model: \_\_\_\_\_

Identify parameters collected:

_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

COMMENTS

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

TURBIDITY DATA

Date/Time: \_\_\_\_\_

Personnel: \_\_\_\_\_

Standard Solution \_\_\_\_\_ NTU

Reading: \_\_\_\_\_

Scale: \_\_\_\_\_

Turbidity\*: \_\_\_\_\_

\* For Turbidity >40 NTU use the formula:

$$\text{Sample Turbidity} = \frac{A \times (B + C)}{C}$$

A = Turbidity of diluted Sample: \_\_\_\_\_ NTU

B = Volume of dilution water: \_\_\_\_\_ ml

C = Sample volume: \_\_\_\_\_ ml

GROUND WATER SAMPLE DATA SHEET

## BLANK SAMPLE

Location Poured: \_\_\_\_\_

Type of Blank: TRAVEL

FIELD

EQUIPMENT: Bailer (lot # \_\_\_\_\_)

Bladder Pump (lot # \_\_\_\_\_)

Type of Water: \_\_\_\_\_

Water Vender: \_\_\_\_\_

Water Lot #: \_\_\_\_\_

Sampling Personnel: \_\_\_\_\_

Weather Conditions (Temp, Sky Cond): \_\_\_\_\_

Date/Time Start: \_\_\_\_\_ Date/Time Complete: \_\_\_\_\_

Comments: \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Appendix B

Decontamination Procedures For Equipment Used In A Groundwater  
Investigation

## DECONTAMINATION PROCEDURES FOR EQUIPMENT USED IN A GROUND WATER INVESTIGATION

Sampling personnel should assume that sampling equipment, either new or used, is contaminated and, therefore, should be decontaminated according to the procedures appropriate for its construction and intended use. The decontamination of equipment should be performed at the laboratory of the sampling team prior to the inspection.

The decontaminated equipment should be packaged to protect it from dust. Aluminum foil is preferred for wrapping the decontaminated equipment. Plastic bags can be used to hold larger items, such as bailers and bladder pumps, after they are wrapped in aluminum foil. A label stating the level of decontamination, date of decontamination, and initials of individual certifying decontamination should be attached to the protective package in such a way that the label will not be torn during unpackaging. A piece of equipment in a package with a torn label should not be used for sampling and should be considered as contaminated.

Field decontamination of sampling equipment should be performed only under extenuating circumstances such as logistical considerations and shortage of dedicated sampling equipment. When field decontamination cannot be avoided, the following general rules should be adhered to:

- 1) No equipment should be decontaminated in the field more than once between laboratory decontamination.
- 2) Equipment used to collect hazardous waste samples must be decontaminated before it can be used to collect environmental samples. In general, any decontaminated equipment should only be used to collect samples of "lower quality" than the first sample collected.
- 3) All decontamination and subsequent use of decontaminated equipment should be documented in a field logbook.
- 4) Equipment should never be reused if visual signs, such as discoloration, indicate that decontamination was insufficient.

Decontamination of small sampling tools, such as soil scoops and containers, is not required if the equipment is properly disposed of after use. Disposable sampling tools and waste products from field decontamination, such as waste rinse water and waste solvent, should be properly disposed of on-site in accordance with the disposal procedures of the facility or should be packaged for off-site disposal.

The following eight sections detail the procedures for the five general levels of decontamination and the field decontamination of pumps, bailers and compositing containers.

#### Level 1 Decontamination

The following decontamination procedures are suitable for glassware and stainless steel equipment that are used for the collection and containerization of organic samples and that can tolerate high temperatures generated by a muffle furnace.

- 1) Wash thoroughly with nonphosphate detergent in hot water
- 2) Rinse several times with tap water
- 3) Rinse several times with reagent grade distilled/deionized water
- 4) Rinse once with acetone
- 5) Rinse once with pesticide grade hexane
- 6) Place in muffle furnace at 450°C for 15 to 30 minutes
- 7) Allow to cool; protect from dust and other contaminants by sealing or covering with aluminum foil

#### Level 2 Decontamination

The following decontamination procedures are suitable for PTFE equipment and stainless steel equipment that are used for collection of organic samples and that cannot withstand the high temperatures of the muffle furnace.

- 1) Wash thoroughly with nonphosphate detergent in hot water
- 2) Rinse several times with tap water
- 3) Rinse several times with reagent grade distilled/deionized water
- 4) Rinse once with acetone
- 5) Rinse once with pesticide grade hexane
- 6) Air dry in hood
- 7) Cap or cover after drying; PTFE bailers and other applicable equipment should be wrapped in aluminum foil and then placed in plastic bags



NOTE: Chromic acid can be used to remove persistent organic deposits. This is never used for metal sample containers.

### Level 3 Decontamination

The following decontamination procedures are suitable for sample containers used to store metal samples.

- 1) Wash thoroughly with nonphosphate detergent in hot water
- 2) Rinse once with 1:1 nitric acid
- 3) Rinse several times with tap water
- 4) Rinse once with 1:1 hydrochloric acid
- 5) Rinse several times with tap water
- 6) Rinse several times with reagent grade distilled/deionized water
- 7) Invert and air dry in dust free environment
- 8) Cap after drying; use aluminum foil

NOTE: If chromic acid is used as cleaning agent, rinsing must be increased. Note the use of chromic acid on bottle box seal.

### Level 4 Decontamination

The following procedures are suitable for decontaminating safety equipment such as respirators, boots, and gloves that are susceptible to degradation by solvent rinsing.

- 1) Brush off loose dirt with soft bristle brush or cloth
- 2) Rinse thoroughly with tap water
- 3) Wash in nonphosphate detergent in warm water
- 4) Rinse thoroughly with tap water
- 5) Rinse thoroughly with reagent grade distilled/deionized water
- 6) Air dry in dust free environment, keep articles out of the sun.
- 7) Store in plastic bags.

U.S. ENVIRONMENTAL PROTECTION AGENCY  
 CLP Sample Management Office  
 P.O. Box 818 - Alexandria, Virginia 22313  
 Phone: 703/557-2490 - FTS/557-2490

SAS Number

SPECIAL ANALYTICAL SERVICE  
 PACKING LIST

Sampling Office: _____  Sampling Contact: _____ (name) _____ (phone)	Sampling Date(s): _____  Date Shipped: _____  Site Name/Code: _____	Ship To:     Attn:	For Lab Use Only   Date Samples Rec'd: _____  Received By: _____
---	--	-----------------------------------	---

Sample Numbers	Sample Description i.e., Analysis, Matrix, Concentration	Sample Condition on Receipt at Lab
1. _____	_____	_____
2. _____	_____	_____
3. _____	_____	_____
4. _____	_____	_____
5. _____	_____	_____
6. _____	_____	_____
7. _____	_____	_____
8. _____	_____	_____
9. _____	_____	_____
10. _____	_____	_____
11. _____	_____	_____
12. _____	_____	_____
13. _____	_____	_____
14. _____	_____	_____
15. _____	_____	_____
16. _____	_____	_____
17. _____	_____	_____
18. _____	_____	_____
19. _____	_____	_____
20. _____	_____	_____

For Lab Use Only

White - SMO Copy, Yellow - Region Copy, Pink - Lab Copy for return to SMO, Gold - Lab Copy



MY 0990

SMO COPY



U.S. ENVIRONMENTAL PROTECTION AGENCY HWI Sample Management Office  
P.O. Box 818, Alexandria, Virginia 22313-4703/557-2490 FTS/557-2490

# ORGANICS TRAFFIC REPORT

Sample Number

YB 428

① Case Number:

Sample Site Name/Code:

② SAMPLE CONCENTRATION  
(Check One)

☐ Low Concentration  
☐ Medium Concentration

④ Ship To:

Attn:

Transfer

Ship To:

③ SAMPLE MATRIX  
(Check One)

☐ Water  
☐ Soil/Sediment

⑤ Regional Office:

Sampling Personnel:

(Name)

(Phone)

Sampling Date:

(Begin)

(End)

⑥ For each sample collected specify number of containers used and mark volume level on each bottle.

Number of  
Containers

Approximate  
Total Volume

Water  
(Extractable)

Water  
(VOA)

Soil/Sediment  
(Extractable)

Soil/Sediment  
(VOA)

Other

Nº YB 428

- Water  
(Extractable)

Nº YB 428

- Water  
(Extractable)

Nº YB 428

- Water  
(Extractable)

Nº YB 428

- Water  
(Extractable)

Nº YB 428

- Water  
(VOA)

Nº YB 428

- Water  
(VOA)

Nº YB 428

- Soil/Sediment  
(Extractable)

Nº YB 428

- Soil/Sediment  
(Extractable)

Nº YB 428

- Soil/Sediment  
(VOA)

Nº YB 428

- Soil/Sediment  
(VOA)

⑦ Shipping Information

Name of Carrier

Date Shipped:

Airbill Number:

⑧ Sample Description

☐ Surface Water ☐ Mixed Media

☐ Ground Water ☐ Solids

☐ Leachate ☐ Other (specify) \_\_\_\_\_

⑨ Sample Location

⑩ Special Handling Instructions:

(e.g., safety precautions, hazardous nature)

## CHAIN OF CUSTODY RECORD

PROJ. NO.		PROJECT NAME				NO. OF CON- TAINERS								REMARKS
SAMPLERS: (Signature)														
STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION									

Relinquished by: (Signature)	Date / Time	Received by: (Signature)

Relinquished by: (Signature)	Date / Time	Received by: (Signature)

Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)

Relinquished by: (Signature)	Date / Time	Receive by: (Signature)

Relinquished by: (Signature)	Date / Time	Received by: (Signature)

Date / Time	Remarks

Distribution: Original Accompanies Shipment; Copy to Coordinator Field Files

602/255-1188  
Jon M. Counts, Dr.P.H.,  
Assistant Director

STATE LABORATORY SERVICES  
CHEMICAL ANALYSIS SUBMITTAL FORM  
1520 W. Adams, Phoenix, Arizona 85007

For Use With All Samples Submitted for Chemical Analysis

Date Received & Lab Number \_\_\_\_\_

SAMPLING POINT DESCRIPTION

Site Name \_\_\_\_\_

T \_\_\_\_\_ R \_\_\_\_\_ Sec \_\_\_\_\_ 1/4 \_\_\_\_\_ 1/4 \_\_\_\_\_ 1/4 \_\_\_\_\_ 1/4 \_\_\_\_\_

COLLECTION METHOD

Grab \_\_\_\_\_ Composite \_\_\_\_\_ Other \_\_\_\_\_

WASTE/SOIL SAMPLING FIELD DATA

Grid Pl. \_\_\_\_\_ Depth \_\_\_\_\_ Method \_\_\_\_\_

SYMPTOMS/FIELD NOTES:

GROUND/WASTE WATER FIELD DATA

DW System # \_\_\_\_\_

Other I.D. # \_\_\_\_\_

Static Water Level \_\_\_\_\_ ft. ☐ LC ☐ MP

Pumping Water Level \_\_\_\_\_ ft. ☐ LS ☐ MP

Pumping Time \_\_\_\_\_ hr \_\_\_\_\_ min \_\_\_\_\_ sec

Discharge \_\_\_\_\_ ☐ GPM ☐ CFS

Sample Collection Method \_\_\_\_\_

Well Casing Evacuations \_\_\_\_\_

Other \_\_\_\_\_

SURFACE WATER FIELD DATA

Water Body Name \_\_\_\_\_

Location \_\_\_\_\_

Gauge Hgt \_\_\_\_\_ Discharge \_\_\_\_\_ CFS

Depth from Surface \_\_\_\_\_

SUBMITTER SHOULD COMPLETE ALL SECTIONS BELOW THIS LINE

Agency Name & Address \_\_\_\_\_

Date Sampled \_\_\_\_\_ Time Sampled \_\_\_\_\_ Date Need Results \_\_\_\_\_

Sample Name/ID \_\_\_\_\_ Station Number \_\_\_\_\_

Sample Collected by \_\_\_\_\_ Phone No. \_\_\_\_\_

Call Results? ☐ YES ☐ NO Number of Bottles \_\_\_\_\_

EHS PROJECT CODE \_\_\_\_\_

CHAIN OF CUSTODY ☐ YES ☐ NO

PRIORITY: ☐ 1 Immediate health or  
environmental emergency

☐ 2 Chronic or potential  
health & environmental  
hazard

☐ 3 Routine surveillance

SAMPLE TYPE \_\_\_\_\_ Milk \_\_\_\_\_ Food  
\_\_\_\_\_ Ground Water \_\_\_\_\_ Surface Water \_\_\_\_\_ Wastewater  
\_\_\_\_\_ Haz Waste \_\_\_\_\_ Soil/Sludge \_\_\_\_\_ Air Filter  
\_\_\_\_\_ Sorbent Tube \_\_\_\_\_ Bulk \_\_\_\_\_ Other \_\_\_\_\_

FIELD DATA Volume Air: (Sorbent Tube Only) \_\_\_\_\_ liters

Appearance \_\_\_\_\_

pH \_\_\_\_\_ Cond (Corrected) \_\_\_\_\_ D.O. \_\_\_\_\_

Air Temp \_\_\_\_\_ Water Temp \_\_\_\_\_

ANALYSIS TYPE (check only one)

☐ Total Digested or Unfiltered Sample

☐ Dissolved (Filtered Sample)

☐ Leachate/EP Tox ☐ Other \_\_\_\_\_

SAFE DRINKING WATER

\_\_\_\_\_ All Inorganic  
\_\_\_\_\_ Primary Standards  
\_\_\_\_\_ Secondary Standards  
SDW Pesticides\*  
SDW Herbicides\*  
Individual Tests\*

AMBIENT SURFACE WATER

\_\_\_\_\_ All Inorganics  
\_\_\_\_\_ Nutrients Only  
Individual Tests\*

HI-VOL FILTER

\_\_\_\_\_ All  
\_\_\_\_\_ TSP  
\_\_\_\_\_ PM10  
\_\_\_\_\_ Nitrate  
\_\_\_\_\_ Sulfate  
\_\_\_\_\_ Arsenic  
\_\_\_\_\_ Cadmium  
\_\_\_\_\_ Lead  
Other\*

INDUSTRIAL HYGIENE

Selected Metals\*  
Selected Solvents (Sorb. Tube)\*  
Other\*

FOOD/MILK

\_\_\_\_\_ Aflatoxin  
\_\_\_\_\_ Milk Pesticide Screen  
\_\_\_\_\_ Vitamin A  
\_\_\_\_\_ Vitamin D  
\_\_\_\_\_ Microscopy  
\_\_\_\_\_ Unknown identification  
Other\*

HAZARDOUS MATERIALS

Total Metals\*  
Selected EP Tox Metals\*  
\_\_\_\_\_ EP Tox Metals (all 8)  
\_\_\_\_\_ EP Tox Pesticides  
\_\_\_\_\_ Corrosivity, NACE  
\_\_\_\_\_ Corrosivity, pH  
\_\_\_\_\_ Flash Point  
\_\_\_\_\_ Reactivity  
\_\_\_\_\_ Solvents (Qual. I.D.)  
Other\*

\* For starred items, specify individual tests below.

INDIVIDUAL TESTS REQUESTED

INORGANICS

\_\_\_\_\_ Acidity  
\_\_\_\_\_ Alkalinity Total  
\_\_\_\_\_ Alkalinity Phenol.  
\_\_\_\_\_ Ammonia  
\_\_\_\_\_ Carbonate/Bicarbonate  
\_\_\_\_\_ Chloride  
\_\_\_\_\_ Chlorine Residual  
\_\_\_\_\_ Conductivity  
\_\_\_\_\_ Cyanide, Total  
\_\_\_\_\_ Cyanide, Amen  
\_\_\_\_\_ Cyanide, Direct  
\_\_\_\_\_ Fluoride  
\_\_\_\_\_ Hardness  
\_\_\_\_\_ IR Spectrum  
\_\_\_\_\_ MBAS  
\_\_\_\_\_ NO3 Nitrate  
\_\_\_\_\_ NO2/NO3 Total  
\_\_\_\_\_ NO2 Nitrite  
\_\_\_\_\_ Nitrogen, Total Kjeldahl  
\_\_\_\_\_ Nitrogen, Organic  
\_\_\_\_\_ Oil & Grease  
\_\_\_\_\_ pH  
\_\_\_\_\_ Phenols, Total  
\_\_\_\_\_ Phosphorus, Total

\_\_\_\_\_ Phosphate, Ortho  
\_\_\_\_\_ Sodium Corrosivity  
\_\_\_\_\_ Sulfate  
\_\_\_\_\_ Sulfide  
\_\_\_\_\_ TDS  
\_\_\_\_\_ TSS  
\_\_\_\_\_ TVSS  
\_\_\_\_\_ Turbidity

METALS

\_\_\_\_\_ Ag (Silver)  
\_\_\_\_\_ Al (Aluminum)  
\_\_\_\_\_ As (Arsenic)  
\_\_\_\_\_ Ba (Barium)  
\_\_\_\_\_ Be (Beryllium)  
\_\_\_\_\_ B (Boron)  
\_\_\_\_\_ Cd (Cadmium)  
\_\_\_\_\_ Ca (Calcium)  
\_\_\_\_\_ Cr (Chromium-Total)  
\_\_\_\_\_ Cr+6 (Hex Chromium)  
\_\_\_\_\_ Co (Cobalt)  
\_\_\_\_\_ Cu (Copper)  
\_\_\_\_\_ Fe (Iron)  
\_\_\_\_\_ K (Potassium)  
\_\_\_\_\_ Hg (Mercury)  
\_\_\_\_\_ Li (Lithium)

\_\_\_\_\_ Mg (Magnesium)  
\_\_\_\_\_ Mn (Manganese)  
\_\_\_\_\_ Mo (Molybdenum)  
\_\_\_\_\_ Na (Sodium)  
\_\_\_\_\_ Ni (Nickel)  
\_\_\_\_\_ Pb (Lead)  
\_\_\_\_\_ Se (Selenium)  
\_\_\_\_\_ Sb (Antimony)  
\_\_\_\_\_ Sn (Tin)  
\_\_\_\_\_ Tl (Thallium)  
\_\_\_\_\_ Ti (Titanium)  
\_\_\_\_\_ V (Vanadium)  
\_\_\_\_\_ Zn (Zinc)

MICROSCOPY/PHYSICAL EXAMS

\_\_\_\_\_ Bulk Asbestos Identification  
\_\_\_\_\_ Filter Counts  
\_\_\_\_\_ Visual Identification

ORGANICS

\_\_\_\_\_ BTX only  
\_\_\_\_\_ Chlorinated Pesticide Scan  
\_\_\_\_\_ Custom GC/MS  
\_\_\_\_\_ SDW Herbicides  
\_\_\_\_\_ SDW Pesticides  
\_\_\_\_\_ DBCP  
\_\_\_\_\_ EDB

\_\_\_\_\_ Org. Phos. Scan  
\_\_\_\_\_ PCBs  
\_\_\_\_\_ Solvents (Qual. ID)  
\_\_\_\_\_ TCE  
\_\_\_\_\_ THMs  
\_\_\_\_\_ VOAs  
(Method 601-2)  
PRIORITY POLLUTANTS  
\_\_\_\_\_ Vol. Fraction  
\_\_\_\_\_ Acid Fraction  
\_\_\_\_\_ B/N Fraction  
\_\_\_\_\_ Pest Fraction

OTHER TESTS (List)

2. \_\_\_\_\_

4. \_\_\_\_\_

6. \_\_\_\_\_

8. \_\_\_\_\_

10. \_\_\_\_\_

12. \_\_\_\_\_

14. \_\_\_\_\_

## Appendix C

Container Requirements And Hold Times Per Analytical Parameter



**Analytical and Contractual Holding Times  
for RAS and common SAS parameters**

(11/87)

Analytical and Contractual Hold Times for RAS Requests

Matrix:	Water		Soil	
<u>Analysis</u>	<u>Analytical Hold Times</u>	<u>Contractual Hold Times</u>	<u>Analytical Hold Times</u>	<u>Contractual Hold Times</u>
VOA	14 days	10 days <sup>a</sup>	14 days	10 days
B/N/A	7 days	5 days	14 days	10 days
Pest./PCB	7 days	5 days	7 days	10 days
Mercury	28 days			
Cyanide	14 days			
TCL Metals	6 months <sup>b</sup>		6 months <sup>b</sup>	

Common SAS Requests for Water Analysis

<u>Parameters</u>	<u>Method</u>	<u>Analytical Holding Times</u>	<u>Method Detection Limit</u>
Alkalinity	305	48 hours <sup>c,d</sup>	10 mg/l
Chromium VI	218	24 hours	0.01 mg/l
Chloride	325	28 days	1 mg/l
Coliform	MPN	6 hours	---- <sup>c</sup>
Flouride	340	28 days	0.5 mg/l
Hardness	130	6 months	10 mg/l
Nitrate/Nitrite	353	28 days	0.1 mg/l
Nitrite	334	48 hours	0.001 mg/l
Oil & Grease	413	28 days	5 mg/l
Phenols	604	28 days	---- <sup>c</sup>
Sulfides	376	7 days <sup>c</sup>	1 mg/l
Sulfates	375	28 days	10 mg/l
pH	150	24 hours <sup>d</sup>	---- <sup>c</sup>

<sup>a</sup> The hold time assumes preservation with 1:1 HCl. If preservatives not used then the hold time is 7 days.

<sup>b</sup> The hold times assume preservation with HNO<sub>3</sub> to pH < 2. If the lab is to filter and preserve the sample then the hold time is 24 hours.

<sup>c</sup> See the method.

<sup>d</sup> Minimize atmospheric exposure before analysis.

SEE ALSO APPENDIX D FOR OTHER INORGANIC WATER ANALYSES

(10/86)

# WATER SAMPLES

<u>Parameter</u>	<u>Concentration</u>	<u>Preservation</u>
Volatiles	Low and Medium	Add 2 drops 1:1 HCl / vial before sample collection Chill to 4° C
Semi- Volatiles	Low and Medium	Chill to 4° C
Pesticides & PCBs	Low and Medium	Chill to 4° C
Dissolved Metals	Low	Filter Sample through 0.45 micron membrane filter. Acidify to pH $\leq$ 2 with HNO <sub>3</sub> . Chill to 4° C.  If filtration is not possible in the field, <u>DO NOT</u> acidify sample. Request filtration from lab.
Total Metals	Low	Includes suspended sediments and particulates. Acidify to pH $\leq$ 2 with HNO <sub>3</sub> . Chill to 4° C.
Cyanides	Low	Preserve all samples with 2 ml of 10 N NaOH per liter of sample to pH $\geq$ 12. Chill to 4° C.  Treatment for chlorine or other known oxidizing agents may be necessary.  Test a drop of the sample with potassium iodide-starch test paper (K-I starch test paper). A blue color indicates the need for treatment.  Add ascorbic acid, a few crystals at a time, until a drop of sample produces no color on the indicator paper. Then add an additional 0.06 g of ascorbic acid for each liter of sample volume.

# SOIL SAMPLES

<u>Parameter</u>	<u>Concentration</u>	<u>Preservation</u>
Organics	Low and Medium	Chill to 4° C

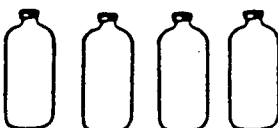
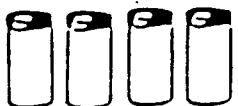

**REQUIRED CONTAINERS, PRESERVATION TECHNIQUES AND HOLDING TIMES**  
 [Sources: 40 CFR PART 136 (7-1-1986 edition) and Arizona State  
 Laboratory]




Parameter	Container	Preservation	Holding Time
<b><u>Bacterial Tests</u></b>			
Coliform, fecal, total	P.G.	Cool 4°C, 0.008% Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub>	6 hours
Fecal streptococci----	P.G.	---- do -----	do
<b><u>Inorganic Tests:</u></b>			
Acidity -----	P.G.	Cool 4°C -----	14 days
Alkalinity -----	P.G.	---- do -----	do
Ammonia -----	P.G.	Cool 4°C, H <sub>2</sub> SO <sub>4</sub> , to pH<2	28 days
BOD -----	P.G.	Cool 4°C -----	48 hours
Bromide -----	P.G.	None required -----	28 days
BOD carbonaceous -----	P.G.	Cool 4°C -----	48 hours
COD -----	P.G.	Cool 4°C, H <sub>2</sub> SO <sub>4</sub> , to pH<2	28 days
Chloride -----	P.G.	None required -----	do
Chlorine tot. resid.	P.G.	---- do -----	analyze immed.
Color -----	P.G.	Cool 4°C -----	48 hours
Cyanide, total and amenable to chlorinat.	P.G.	Cool 4°C, NaOH to pH>12, 0.6g ascorbic acid -----	14 days
DO, Probe -----	G Bottle		
	and top.	None required -----	analyze immed.
DO, Winkler -----	do	Fix on site, store in dark	8 hours
Fluoride -----	P.	None required -----	28 days
Hardness -----	P.G.	HNO <sub>3</sub> to pH<2, H <sub>2</sub> SO <sub>4</sub> to pH<2	6 months
Hydrogen ion (pH) ----	P.G.	None required -----	analyze immed.
Kjeldahl & org. nitro.	P.G.	Cool 4°C, H <sub>2</sub> SO <sub>4</sub> to pH<2	28 days
Nitrate -----	P.G.	Cool 4°C -----	48 hours
Nitrate-nitrite -----	P.G.	Cool 4°C, H <sub>2</sub> SO <sub>4</sub> to pH<2	28 days
Nitrite -----	P.G.	Cool 4°C -----	48 hours
Orthophosphate -----	P.G.	Filter immed., Cool 4°C	48 hours
Phosphorus (elemen.)	G.	Cool 4°C -----	48 hours
Phosphorus (total)	P.G.	Cool 4°C, H <sub>2</sub> SO <sub>4</sub> to pH<2	28 days
Residue, total -----	P.G.	Cool 4°C -----	7 days
Residue, filterable(TDS)	P.G.	---- do -----	7 days
Residue, non filtrat.	P.G.	---- do -----	7 days
Residue, settleable	P.G.	---- do -----	48 hours
Residue, volatile	P.G.	---- do -----	7 days
Silica -----	P.	---- do -----	28 days
Specific conductance	P.G.	---- do -----	do
Sulfate -----	P.G.	---- do -----	do
Sulfide -----	P.G.	Cool 4°C, add zinc acetate plus sodium hydroxide to pH>9.	7 days
Sulfite -----	P.G.	---- None required ----	analyz. immed.
Surfactants -----	P.G.	Cool 4°C -----	48 hours
Temperature -----	P.G.	---- None required ----	analyze
Turbidity -----	P.G.	Cool 4°C -----	48 hours

**REQUIRED CONTAINERS, PRESERVATION TECHNIQUES AND HOLDING TIMES (cont.)**  
**[Sources: 40 CFR PART 136 (7-1-1986 edition) and Arizona State Laboratory]**

Parameter	Container	Preservation	Holding Time
<b><u>Metals</u></b>			
Chromium VI -----	P.G.	Cool 4°C -----	24 hours
Mercury -----	P.G.	HNO <sub>3</sub> to pH<2 -----	28 days
Other metals -----	P.G.	----- do -----	6 months
Oil and Grease -----	G.	Cool 4°C, H <sub>2</sub> SO <sub>4</sub> to pH<2	28 days
Organic carbon -----	P.G.	Cool 4°C, HCl or H <sub>2</sub> SO <sub>4</sub> to pH,2 -----	do
<b><u>Organic Tests</u></b>			
PCBs acrylonitrile --	do	Cool 4°C -----	7 days until extr. 40 days after extr.
Phenols -----	G., Teflon, lined cap.	Cool 4°C, add H <sub>3</sub> PO <sub>4</sub> to pH<4, add CuSO <sub>4</sub>	24 hours
Semi-Volatile Organics	G., Teflon lined Septum	Cool 4°C -----	14 days
Trihalomethanes (THM'S)	G.	----- do -----	Analyze as soon as possible
Volatile Organics ---	G., Teflon lined Septum	Cool 4°C -----	14 days
<b><u>Pesticides Tests</u></b>			
Pesticides and Herbicides	do -----	Cool 4°C, pH 5-9,	7 days until extr. 40 days after extr.
DBCP -----	do -----	Cool 4°C -----	do
EDB -----	do -----	do -----	do
Aldicarb -----	do -----	do -----	do
<b><u>Radiological Tests</u></b>			
Alpha, beta and radium	P.G.	HNO <sub>3</sub> to pH<2 -----	6 months
-----			
P = Polyethylene	G = Glass		

# ORGANIC SAMPLE COLLECTION REQUIREMENTS




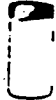
WATER SAMPLES	REQUIRED VOLUME		CONTAINER TYPE
EXTRACTABLE ANALYSIS (LOW LEVEL)	1 GALLON		4 x 1-LITER AMBER GLASS BOTTLES
EXTRACTABLE ANALYSIS (MEDIUM LEVEL*)	1 GALLON		4 x 32-OZ. WIDE-MOUTH GLASS JARS
VOLATILE ANALYSIS (LOW OR MEDIUM LEVEL*)	80 ML		2 x 40-ML GLASS VIALS

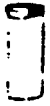

SOIL/SEDIMENT SAMPLES	REQUIRED VOLUME		CONTAINER TYPE
EXTRACTABLE ANALYSIS (LOW OR MEDIUM LEVEL*)	6 OZ.		1 x 8-OZ. WIDE-MOUTH GLASS JAR
		OR	
			2 x 4-OZ. WIDE-MOUTH GLASS JARS
VOLATILE ANALYSIS (LOW OR MEDIUM LEVEL*)	240 ML		2 x 120-ML WIDE-MOUTH GLASS VIALS

\*ALL MEDIUM LEVEL SAMPLES TO BE SEALED IN METAL PAINT CAN FOR SHIPMENT



# INORGANIC SAMPLE COLLECTION REQUIREMENTS

WATER SAMPLES	REQUIRED VOLUME		CONTAINER TYPE
METALS ANALYSIS (LOW LEVEL)	1 LITER		1 x 1-LITER POLYETHYLENE BOTTLE
METALS ANALYSIS (MEDIUM LEVEL*)	16 OZ.		1 x 16-OZ. WIDE-MOUTH GLASS JAR
CYANIDE (CN <sup>-</sup> ) ANALYSIS (LOW LEVEL)	1 LITER		1 x 1-LITER POLYETHYLENE BOTTLE
CYANIDE (CN <sup>-</sup> ) ANALYSIS (MEDIUM LEVEL*)	16 OZ.		1 x 16-OZ. WIDE-MOUTH GLASS JAR

SOIL/SEDIMENT SAMPLES	REQUIRED VOLUME		CONTAINER TYPE
METALS AND CYANIDE (CN <sup>-</sup> ) ANALYSIS (LOW OR MEDIUM LEVEL*)	6 OZ.		1 x 8-OZ. WIDE-MOUTH GLASS JAR
			OR 2 x 4-OZ. WIDE-MOUTH GLASS JARS

\*ALL MEDIUM LEVEL SAMPLES TO BE SEALED IN METAL PAINT CAN FOR SHIPMENT



## Appendix D

Sample Treatment And Preservation For RAS And SAS Parameters



## WATER SAMPLES

<u>Parameter</u>	<u>Concentration</u>	<u>Preservation</u>
Volatiles (EPA RAS Method 624 and SAS Methods 601 <sup>a</sup> & 602)	Low/Medium	Add 2 drops 1:1 HCl/vial before sample collection. Chill to 4° C. Samples must be filled to zero headspace. If acidification causes bubbling, do not acidify and notify the RSCC.
<sup>a</sup> For volatile halocarbon analyses by EPA method 601, acidify all <u>low</u> concentration groundwater and other drinking water samples. Do not acidify surface water, wastewater or any medium concentration samples.		
Semivolatiles	Low/Medium	Chill to 4° C
Pesticides/PCBs	Low/Medium	Chill to 4° C
Dissolved Metals	Low	Filter Sample through 0.45 micron membrane filter. Acidify to pH $\leq$ 2 with HNO <sub>3</sub> . Chill to 4° C.  If filtration is not possible in the field, <u>DO NOT</u> acidify sample. Request filtration from lab.
Total Metals	Low	Includes suspended sediments and particulates. Acidify to pH $\leq$ 2 with HNO <sub>3</sub> . Chill to 4° C.
Cyanides	Low	Preserve all samples with 2 ml of 10 N NaOH per liter of sample to pH $\geq$ 12. Chill to 4° C.  Treatment for chlorine or other known oxidizing agents may be necessary.  Test a drop of the sample with potassium iodide-starch test paper (K-I starch test paper). A blue color indicates the need for treatment.  Add ascorbic acid, a few crystals at a time, until a drop of sample produces no color on the indicator paper. Then add an additional 0.06 g of ascorbic acid for each liter of sample volume.

## SOIL SAMPLES

<u>Parameter</u>	<u>Concentration</u>	<u>Preservation</u>
Organics	Low/Medium	Chill to 4° C

## SAMPLE PRESERVATION

Complete and unequivocal preservation of samples, either domestic sewage, industrial wastes, or natural waters, is a practical impossibility. Regardless of the nature of the sample, complete stability for every constituent can never be achieved. At best, preservation techniques can only retard the chemical and biological changes that inevitably continue after the sample is removed from the parent source. The changes that take place in a sample are either chemical or biological. In the former case, certain changes occur in the chemical structure of the constituents that are a function of physical conditions. Metal cations may precipitate as hydroxides or form complexes with other constituents; cations or anions may change valence states under certain reducing or oxidizing conditions; other constituents may dissolve or volatilize with the passage of time. Metal cations may also adsorb onto surfaces (glass, plastic, quartz, etc.), such as, iron and lead. Biological changes taking place in a sample may change the valence of an element or a radical to a different valence. Soluble constituents may be converted to organically bound materials in cell structures, or cell lysis may result in release of cellular material into solution. The well known nitrogen and phosphorus cycles are examples of biological influence on sample composition. Therefore, as a general rule, it is best to analyze the samples as soon as possible after collection. This is especially true when the analyte concentration is expected to be in the low  $\mu\text{g/l}$  range.

Methods of preservation are relatively limited and are intended generally to (1) retard biological action, (2) retard hydrolysis of chemical compounds and complexes, (3) reduce volatility of constituents, and (4) reduce absorption effects. Preservation methods are generally limited to pH control, chemical addition, refrigeration, and freezing.

The recommended preservative for various constituents is given in Table I. These choices are based on the accompanying references and on information supplied by various Quality Assurance Coordinators. As more data become available, these recommended holding times will be adjusted to reflect new information. Other information provided in the table is an estimation of the volume of sample required for the analysis, the suggested type of container, and the maximum recommended holding times for samples properly preserved.